DOCUMENT RESUME

ED 429 805 SE 062 015

AUTHOR Chen, Loris
TITLE Where Are the Gardens in the Garden State? Middle School Lessons on Sustainable Agriculture and Farmland Preservation.
INSTITUTION Global Learning, Inc., Union, NJ.
ISBN ISBN-0-928630-04-8
PUB DATE 1998-00-00
NOTE 93p.
PUB TYPE Guides - Classroom - Teacher (052)
EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS Agriculture; *Conservation Education; Environmental Education; *Geography; Geology; Human Geography; Interdisciplinary Approach; Land Use; *Map Skills; Middle Schools; State History; Study Skills; *Sustainable Development; *Topography
IDENTIFIERS Environmental Awareness; Farmland; *New Jersey

ABSTRACT

This unit helps middle school students explore the local face of a global challenge: vanishing farmland and the need for sustainable agriculture. With an eye on the National Geography Standards and five areas of the New Jersey core curriculum standards, this unit also develops the skills needed to contribute toward creative solutions for such problems. This unit was developed as a nine-week study skills project for seventh grade students and includes the core subject classes of mathematics, science, social studies, reading, and writing. The 12 lessons can also be taught individually. Objectives of the 12 lessons include learning about population distribution and density, creation of various kinds of maps and graphs, inferring relationships between farm locations and soil types, researching agricultural best management practices for preserving farmland, and negotiating a consensus position on farmland preservation with persons representing a variety of viewpoints. Many of the lessons contain reading selections. Study skills pre- and post-tests, a glossary, and references are also included. (PVD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 429 805

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY
J. Brown
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
1

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
X This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Where Are the Gardens in the Garden State?

Middle School Lessons on Sustainable Agriculture and Farmland Preservation

BEST COPY AVAILABLE

seals2015

Global Learning, Inc.

global Learning, Inc.

1018 Stuyvesant Avenue, Union, NJ 07083-6023 (908) 964-1114 FAX -6335

Global Learning, Inc. is a non-profit educational organization that translates the world's growing interdependence into educational activities for teachers, students, librarians, and educational systems, from elementary school through college and in community settings.

Advisory Committee

James B. Boskey
Professor of Law
Seton Hall Law School

Shirley Gillette
Director
Education Outreach
WNET 13

Carl Henn
Vice President
Royal Capital, Inc

Saul Mendlovitz
Director
World Policy Institute

Linda Stamato
Associate Director
Center for Negotiation
& Conflict Resolution
Rutgers University

Axel O. Velden
Director
Export Division
Johnson & Johnson
International

Our **Sustainable Development Program** is currently partnering with the American Library Association in the *Local Libraries: Global Awareness Project.* We are also developing middle school and high school teacher resources highlighting New Jersey and Sustainable Development. We have previously developed three teacher resources focusing on the interrelated concepts of the *environment, development* and *equity*:

Sustaining the Future: Activities for Environmental Education in US History, for high schools;

A Sustainable Development Curriculum Framework for World History & Cultures, for high schools;

Making Global Connections in the Middle School: Lessons on the Environment, Development & Equity.

The **Conflict Mediators Program** trains teachers and students in nonviolent conflict resolution and mediation skills. We help teachers incorporate these concepts and skills within their existing curriculum and help set up ***student peer mediation programs*** in elementary, middle and high schools.

Global Learning's approach to **Multicultural Education** is based on a commitment to increasing equity within our own pluralistic society and a vision of a healthy, inclusive human community. We stress the development of cross-cultural attitudes and skills that help students and teachers interact positively with people who may appear different from themselves.

Global Learning's services for schools, colleges and professional associations include:

- Program presentations
- In-service workshops
- Curriculum development consultations
- Conference planning
- Professional networking.

Global Learning also provides affirmative action workshops on cross-cultural awareness and conflict resolution for corporations.

Jeffrey L. Brown
Executive Director

Paula Gotsch
Associate Director

email: globallearning@worldnet.att.net http://viconet.com/~schnarr/global.htm

Where Are the Gardens in the Garden State?

Middle School Lessons on Sustainable Agricultural and Farmland Preservation

by **Loris Chen**
Teacher
North Arlington Middle School

Global Learning, Inc.
1018 Stuyvesant Avenue
Union, NJ 07083
(908) 964-1114

ISBN 0-928630-04-8

Copyright © 1998 by Global Learning, Inc.

The material in this volume may be reproduced for classroom use at the instance and inspiration of the individual teacher. Reproduction by any means, mechanical or electronic, for any purpose other than classroom use is prohibited without written permission from the publisher.

Editor: Jeffrey L. Brown

Layout: Bucky Schnarr

Acknowledgements

We at Global Learning gratefully acknowledge the following financial contributors to the New Jersey and Sustainable Development Project: Aarhus, Inc., Bristol-Myers Squibb Company and Foundation, the Chase Manhattan Foundation, the Geraldine R. Dodge Foundation, the Liss Family Foundation, Lucent Technologies, Najarian Associates, Inc., the PSE&G Foundation, Tosco Refining Company, and the US Environmental Protection Agency.

The original writing of this unit was made possible by a grant from the National Geographic Society Education Foundation. However, the author is solely responsible for the content.

Printed with soy-based ink on recycled paper in the United States of America.

Contents

Introduction 5

Overview 7

Lesson Plans 8

Academic Standards and Skill Assessments Supported by this Unit 11

Study Skills Pre-Test 15

Study Skills Post-Test 19

Answer Keys to Pre-Test and Post-Test 23

Lesson 1 *Where are the people, and why are they there?* 24
Lesson 2 *Where will the people be?* 25
Lesson 3 *How dense is dense?* 30
Lesson 4 *What's a big county?* 34
Lesson 5 *What's growing in the Garden State?* 36
Lesson 6 *Where are the farms?* 40
Lesson 7 *How are soils, bedrock and farms related?* 44
Lesson 8 *What puts the green in Garden State farming?* 51
Lesson 9 *Why are farmlands on the edge in New Jersey?* 58
Lesson 10 *Can agriculture be sustained in New Jersey?* 59
Lesson 11 *Should state government help preserve farmland?* 68
Lesson 12 *Can we find common ground?* 77

Answers to Lesson Questions 80

Glossary 85

References 86

Introduction

Where Are the Gardens in the Garden State? helps middle school students explore the local face of a global challenge. With an eye clearly on the national Geography Standards and five areas of New Jersey's core curriculum standards, the unit also develops the skills needed to contribute toward creative solutions for such problems.

This unit examines one aspect of the question of sustainability—the conjoined twins of sustainable agriculture and farmland preservation. The need to sustain agriculture and preserve farmland is not just one state's problem. From 1982 to 1992 the United States lost cropland equivalent to the size of our entire state and saw an area twice the size of New York paved over. And globally speaking, between 1945 and 1990, erosion, salination, waterlogging, and other degradation removed an area equal to the cropland of two Canadas from food production. Land-tight China, for example, lost roughly 3 percent of its total cropped area between 1987 and 1992. As in New Jersey, some of the land was claimed by expanding urban areas, and China hopes to build 600 new cities by 2010, thus doubling the number it has now. As Gary Gardner writes in *Shrinking Fields: Cropland Loss in a World of Eight Billion,* "In an increasingly land-tight world, and with demand for food rising dramatically, losses of this magnitude cannot be repeated without grave consequences." (Worldwatch Paper 131, 1996)

To sustain agriculture in New Jersey, the state needs, among other things, to preserve farmland against the increasing pressures of suburban sprawl. Preserving farmland has a number of positive effects. New Jersey farms provide a significant amount of good food to consumers. Farming provides livelihoods to a noteworthy number of residents, both directly for farmers and indirectly for those who sell farm implements and supplies, or who use farm products in the food processing and pharmaceutical industries. Farming in the country's most urbanized state reduces population congestion and maintains diversity in New Jersey's lifestyles. It provides habitats for various animals and plants and can have a positive impact on air and water quality, although it can have negative impacts as well. Sustainable agriculture helps farmers make a decent living while cutting down on their negative environmental impacts.

The broader concept of *sustainable development* is a global effort to forge a common vision of a more just, humane and ecologically benign future for all. First defined in *Our Common Future,* a 1987 report to the UN General assembly, sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their needs." This definition stresses the interrelationship of **environmental protection**, **economic/political development**, and **social equity** and has permeated not only the UN system, but national and local governments as well. The Earth Summit in Rio de Janeiro in 1992 and special UN sessions in June 1997 were assessments of the

status of sustainability across the globe. In this country the President's Council on Sustainable Development released its major report *Sustainable America* in 1996 and is planning a National Summit on Sustainable Development in Detroit for early 1999. *Communities of Place: The New Jersey State Development and Redevelopment Plan* was issued in 1992, and local cities and towns have joined nonprofit groups in promoting sustainable communities across the nation.

Where Are the Gardens in the Garden State? is part of Global Learning's New Jersey and Sustainable Development Project which is developing classroom resources that help middle and high school teachers meet the State's requirements for teaching about New Jersey as well as for teaching standards of excellence across the curriculum.

Jeffrey L. Brown
Executive Director
Global Learning, Inc.

8

Overview

This unit was originally developed and taught four times as a nine week study skills project in seventh grade and included the core subject classes of mathematics, science, social studies, reading and writing. Teachers are encouraged to adapt the materials to accomodate different timeframes.

Housekeeping

1. Students will take a pre-test the first day of the unit.
2. Organize students into groups of 4.
3. Create expandable folders for individual student work and for group work.
4. Students will take a post-test after lesson 12.
5. Student achievement will be evaluated on the basis of self-assessment of group contribution, teacher observation of individual effort, completion and quality of group assignments, individual debate presentation, group debate presentation, and post-test results.

Materials Needed

calculators	maps
pens/pencils	atlases
colored pencils	dictionaries
markers	thesaurus
rulers	reference books
protractors	copies of lessons from this book
notebook paper	copies of data sheets from this book
graph paper	copies of readings from this book
clear acetates	statistical tables from various sources
group folders	

The NJN video *Farmlands on the Edge* is recommended for lesson 9. Another NJN video about cranberry farming, *It's Red! It's Edible! It Bounces!* can also be used in lesson 7 since it deals with the specialized soil needs and the environmental restrictions that are placed on farmers. NJN videos may be available in your local library, or for purchase for $19.95 from NJN Video, CN 777, Trenton, NJ 08625 (609) 777-5093.

Lesson Plans

Lesson 1 ***Where are the people, and why are they there?***

Objective: To use a map to answer geographic questions related to the distribution of population in New Jersey.
Time: 1 class period
Materials: road map of New Jersey, group folders, notebook paper, pens/pencils

Lesson 2 ***Where will the people be?***

Objective: To compare and contrast New Jersey population distribution in 1990 with that projected for 2010 using chloropleth maps.
Time: 2 class periods
Day 1: Chloropleth Maps
Materials: data sheets 1 and 2, state maps, colored pencils, group folders, notebook paper, pen or pencil
Day 2: Questions and Answers

Lesson 3 ***How dense is dense?***

Objective: To compare and contrast population distribution within New Jersey using chloropleth maps.
Time: 3 class periods
Day 1: Chloropleth Maps
Materials: state maps, pen or pencil, colored pencils, data sheet 3, notebook paper, group folders
Day 2: Questions
Day 3: Sharing

Lesson 4 ***What's a big county?***

Objective: To compare and contrast population distribution and land area by counties in New Jersey using a pie graph.
Time: 2 class periods
Day 1: Pie Graphs
Materials: pie graph sheets, pencil, protractor, data sheet 4, group folder
Day 2: Calculations and Sharing

Lesson 5 ***What's growing in the Garden State?***

Objective: To create a line graph showing New Jersey population trends from 1726 to 2010.
Time: 1 class period
Materials: data sheet 5, reading, graph paper, pencil, ruler, notebook paper, state maps, group folder

Lesson 6 ***Where are the farms?***

Objective: To compare and contrast acres of land in farms by county in 1987 and 1992, using a chloropleth map and a bar graph.
Time: 2 class periods
Day 1: Mapping and graphing
Materials: state maps, group folder, colored pencils, graph paper, data sheet 6, pen or pencil, notebook paper
Day 2: Questions and Sharing

Lesson 7 ***How are soils, bedrock and farms related?***

Objective: To analyze the relationships between parent rock and soil type and between soil type and location of farmlands in New Jersey.
Time: 2 class periods
Day 1: Overlay Mapping
Materials: reading, bedrock map, soil map, Resource Planning and Management Map (RPMM) of the first *New Jersey State Development and Redevelopment Plan*—available from the Office of State Planning (609) 292-6000, markers, either duplicated copies of the soil map on acetate transparencies (preferred) or acetate sheets or tracing paper for students to trace onto transparencies, group folder, notebook paper, pen or pencil, optional NJN video—*It's Red! It's Edible! It Bounces!*
Day 2: Questions and Sharing

Lesson 8 ***What puts the green in Garden State farming?***

Objective: To compare and contrast commodities produced in New Jersey based on cash receipts using a pictogram and a bar graph.
Time: 2 class periods
Materials: graph paper, pencil or pen, colored pencils, ruler, notebook paper, group folder, data sheets 7 - 12

Lesson 9 ***Why are farmlands on the edge in New Jersey?***

Objective: To identify economic and population changes that have affected agricultural activity in New Jersey.
Time: 3 class periods
Day 1: view video
Materials: *Farmlands on the Edge* (NJN video), notebook paper, pen or pencil,
Day 2: view video
Day 3: process video information

Lesson 10 ***Can agriculture be sustained in New Jersey?***

Objective: To research questions and define terms that may be used during a hearing in Lesson 11 on funding for the Farmland Preservation Act.
Time: 5 class periods
Divide the research work among the groups so that the materials can be shared efficiently. Allow 3 days for research and 2 days for sharing.
Materials: reading, atlases, notebook paper, dictionaries, group folders, thesaurus, encyclopedias, various reference materials

Lesson 11 ***Should state government help preserve farmland?***

Objective: To demonstrate understanding of research methods and data presentation by preparing a debate presentation on the topic of state government's role in farmland preservation.
Time: 7 days
Allow 5 days for groups to prepare materials and practice speeches. Allow 2 days for the debate.
Materials: reading, large sheets of paper, notebook paper, markers, colored pencils, reference materials, group folders

Lesson 12 ***Can we find common ground?***

Objective: Negotiate a consensus position on farmland preservation, considering a variety of viewpoints, and projecting the consequences of the consensus position.
Time: 1-2 days
Materials: state maps, group folders, large sheets of paper, markers, colored pencils, notebook paper, masking tape, reference materials

Academic Standards and Skill Assessments Supported by this Unit

Lesson	National Geography Standards	New Jersey Department of Education Standards				
		Social Studies	Science	Math	Language Arts	Workplace Readiness
1	1	6.7				2
2	3	6.7, 6.8		4.4		2
3	12	6.7, 6.8		4.4	3.1, 3.4	2, 3
4	3, 12	6.7, 6.8		4.13		2, 3
5	3, 12	6.7, 6.8		4.13		2, 3
6	12	6.7, 6.8		4.13		2, 3
7	12	6.7, 6.8	5.10, 5.12		3.4, 3.5	2, 3
8	11	6.6	5.1, 5.12	4.4, 4.13		2, 3
9	11	6.3, 6.6, 6.8, 6.9			3.4, 3.5	2, 3
10	18	6.3, 6.6, 6.8, 6.9	5.12		3.1, 3.2, 3.3	2, 3
11	13, 18	6.1, 6.4, 6.6, 6.7, 6.8, 6.9	5.12		3.1, 3.2, 3.3, 3.4	2, 3
12	1, 3, 12, 13, 18	6.6, 6.7, 6.9		4.4, 4.13	3.1, 3.2, 3.3, 3.4	2, 3

National Geography Standards

Standard 1 The World in Spatial Terms: How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective

Standard 3 The World in Spatial Terms: How to analyze the spatial organization of people, places, and environments on Earth's surface

Standard 11 Human Systems: The patterns and networks of economic interdependence on Earth's surface

Standard 12 Human Systems: The processes, patterns, and functions of human settlement

Standard 13 Human Systems: How the forces of cooperation and conflict among people influence the division and control of Earth's surface

Standard 18 The Uses of Geography: How to apply geography to interpret the present and plan for the future

New Jersey Standards: Social Studies

Standard 6.1 All students will learn democratic citizenship and how to participate in the constitutional system of government of the United States.

Standard 6.3 All students will acquire historical understanding of political and diplomatic ideas, forces, and institutions throughout the history of New Jersey, the U.S., and the world.

Standard 6.4 All students will aquire historical understanding of societal ideas and forces throughout the history of New Jersey, the United States, and the world.

Standard 6.6 All students will acquire historical understanding of economic forces, ideas, and institutions through the history of New Jersey, the U.S., and the world.

Standard 6.7 All students will acquire geographical understanding by studying the world in spatial terms

Standard 6.8 All students will acquire geographical understanding by studying human systems in geography.

Standard 6.9 All students will acquire geographical understanding by studying the environment and society.

New Jersey Standards: Mathematics

Standard 4.4 All students will develop reasoning ability and will become self-reliant, independent mathematical thinkers through experiences which reinforce and extend their mathematical and logical thinking skills.

Standard 4.13 All students will develop an understanding of algebraic concepts and processes through experiences which enable them to describe, represent, and analyze relationships among variable quantities, and to apply algebraic methods to solve problems.

New Jersey Standards: Language Arts

Standard 3.1 All students will speak for a variety of real purposes and audiences in a variety of contexts.

Standard 3.2 All students will listen actively in a variety of situations to information from a variety of sources.

Standard 3.3 All students will compose texts that are diverse in content and form for different audiences and for real and varied purposes.

Standard 3.4 All students will read, listen to, view, and respond to a diversity of materials and texts with comprehension and critical analysis.

Standard 3.5 All students will view, understand, and use nontextual visual information and representations for critical comparison, analysis, and evaluation.

New Jersey Standards: Science

Standard 5.1 All students will learn to identify systems of interacting components and understand how their interactions combine to produce the overall behavior of the system.

Standard 5.10 All students will gain an understanding of the structure, dynamics, and geophysical systems of the earth.

Standard 5.12 All students will develop an understanding of the environment as a system of interdependent components affected by human activity and natural phenomena.

New Jersey Standards: Workplace Readiness

Standard 2 All students will use technology, information, and other tools.

Standard 3 All students will use critical thinking, decision-making, and problem solving skills.

New Jersey Skill Assessment: Social Studies

1. Students will demonstrate the ability to recognize the distinct characteristics of maps, globes, graphs, charts, diagrams, and other geographical representations, and evaluate the utility of each by solving geographical problems, by creating appropriate maps, charts, diagrams, and graphs to support their written responses to geographic questions.
2. Students will give reasons for the changes in spatial patterns of human activities.
3. Students will demonstrate the ability to assess positions of proponents and opponents at a turning point in New Jersey history by identifying reasons to support or oppose the Farmland Preservation Act.
4. Students will demonstrate an ability to evaluate a decision about the balance between economic growth and environmental preservation by preparing a brief speech stating their position using facts and expert opinion gathered during the course.

New Jersey Skill Assessment: Mathematics

1. Students will demonstrate the ability to justify, in clear and organized form, answers and solution processes in a variety of problems.
2. Students will demonstrate the ability to represent situations and number patterns as tables and graphs.

New Jersey Skill Assessment: Language Arts

1. Students will demonstrate the ability to cite sources of information, answer questions, and write a speech.
2. Students will demonstrate the ability to view and understand visual media by collecting information from a videotape.
3. Students will demonstrate the ability to speak before a group by presenting a case for or against the Farmland Preservation Act.

New Jersey Skill Assessment: Science

1. Students will use map overlays to draw conclusions regarding the human uses of soil and the relationship between soil and parent rock material.
2. Students will demonstrate the ability to evaluate the effect of human activity on the local and global environment by identifying and forecasting the environmental impacts of urbanization and various agricultural practices.

Study Skills Pre-Test

Name _____ Section _____ Date _____

Instructions Circle the letter of the statement that best answers the question.

1. Which of the following is the definition of a map?
   a. A map is a scale model of the earth on which shapes, areas, distances, and directions are accurately represented.
   b. A map is a symbolic representation of the earth's surface on a flat piece of paper that is usually drawn to scale.
   c. A map is a flat diagram that must have a scale of miles and compass rosette to show orientation.
   d. None of these is a definition of a map.

2. If you wanted to display continuous event data, such as the population of New Jersey from 1623 to 2010, which of the following would you use?
   a. a bar graph
   b. a pie graph
   c. a pictogram
   d. a line graph

3. If you wanted to compare the dollar value generated by the production of blueberries, cranberries, tomatoes, and soybeans in a given year, which of the following would you use?
   a. a pictogram
   b. a pie graph
   c. a histogram
   d. a line graph

4. Which type of graph would you use to show the following information? Total crop production by category: 10% blueberries, 20% soybeans, 50% nursery stocks, 20% vegetables.
   a. a bar graph
   b. a pie graph
   c. a histogram
   d. a line graph

5. Complete the statement. A chloropleth map .....
   a. shows the location of forests and other green open spaces.
   b. is the conceptual framework that explains the size, spacing, and distribution of settlements and their economic relationships with their hinterlands.
   c. shows the differences between areas by using colors or shading to represent distinct categories of qualities or quantities.
   d. is the compilation, structuring, and categorization of information for analysis and interpretation.

6. To find the definition of a word used in a book or bound report, you would look in ...

   a. the index
   b. the table of contents
   c. the glossary
   d. the bibliography

7. To find out the sources of information used by an author, you would look in ...

   a. the index
   b. the table of contents
   c. the glossary
   d. the bibliography

8. To find a topic discussed in a book or bound report, you would look in ....

   a. the index
   b. the table of contents
   c. the glossary
   d. the bibliography

9. To find words that are similar in meaning, you would use...

   a. a dictionary
   b. an encyclopedia
   c. a thesaurus
   d. an almanac

10. Which of the following best defines sustainable agriculture?

    a. The production of agricultural goods to meet the needs of today without compromising the ability of future generations to meet their needs.
    b. A form of agriculture with an emphasis on self-support in which crops or livestock are cultivated for personal consumption rather than for sale.
    c. The capacity of a country to balance economic, social, and institutional needs as population and societal needs change over time.

11. Which of the following is <u>not</u> an example of an agricultural best management practice?

    a. integrated pest management
    b. contour plowing
    c. unrestricted use of herbicides
    d. reduction of fertilizer by selective cropping

12. A farmer using integrated pest management would...

    a. use insecticides on a bi-weekly schedule during the growing season
    b. use insecticides when the pest level reaches the threshold limit
    c. use insecticides prior to and during the growing season on a fixed schedule
    d. use a combination of insecticides and herbicides to control pests

13. The objective of the Farmland Preservation Act is to....

    a. help farmers stay in agriculture by providing subsidies for certain crops.
    b. set aside land that will always be used for agricultural purposes.
    c. prevent developers from buying farmland and putting up a mall.
    d. protect water resources by limiting environmentally harmful agricultural practices.

14. Which of the following is the most densely populated county in New Jersey?

    a. Bergen
    b. Essex
    c. Hudson
    d. Passaic

15. Which of the following is the most densely populated state?

    a. New York
    b. California
    c. Delaware
    d. New Jersey

16. Which New Jersey county has no acres in farms?

    a. Bergen
    b. Essex
    c. Hudson
    d. Passaic

17. Population density is ...

    a. the population per square mile
    b. the population per county unit
    c. the population in a given unit or area
    d. the population per square kilometer

18. A headcount of the population of a country is called ...

    a. a concensus
    b. a plurality
    c. a vote
    d. a census

19. The most profitable agricultural commodity produced in New Jersey is ....

    a. cranberries
    b. horses
    c. tomatoes
    d. chickens

20. The major trading partner for New Jersey agricultural exports is ....

a. Canada
b. Mexico
c. Japan
d. France

True (T) or False (F)

21. ____The total acreas of land in farms in New Jersey in 1994 is about the same as it was in 1956.

22. ____The population of New Jersey is expected to stop growing by the year 2000.

23. ____The population of every county is New Jersey is expected to increase by the year 2010.

24. ____New Jersey is more densely populated in 1995 than Japan or India.

25. ____New Jersey is the largest producer of tomatoes in the United States.

Explain

26. Give one reason why New Jersey should or should not pursue a public policy of farmland preservation. Explain your answer.

20

Study Skills Post-Test

Name _____ Section _____ Date _____

Instructions Circle the letter of the statement that best answers the question.

1. Which of the following is the definition of a map?
   a. A map is a symbolic representation of the earth's surface on a flat piece of paper that is usually drawn to scale.
   b. A map is a scale model of the earth on which shapes, areas, distances, and directions are accurately represented.
   c. A map is a flat diagram that must have a scale of miles and compass rosette to show orientation.
   d. None of these is a definition of a map.

2. If you wanted to display continuous event data, such as the population of New Jersey from 1623 to 2010, which of the following would you use?
   a. a bar graph
   b. a pie graph
   c. a line graph
   d. a pictogram

3. If you wanted to compare the dollar value generated by the production of blueberries, cranberries, tomatoes, and soybeans in a given year, which of the following would you use?
   a. a line graph
   b. a pie graph
   c. a histogram
   d. a pictogram

4. Which type of graph would you use to show the following information? Total crop production by category: 10% blueberries, 20% soybeans, 50% nursery stocks, 20% vegetables.
   a. a bar graph
   b. a line graph
   c. a histogram
   d. a pie graph

5. Complete the statement. A chloropleth map .....
   a. shows the location of forests and other green open spaces.
   b. is the compilation, structuring, and categorization of information for analysis and interpretation.
   c. is the conceptual framework that explains the size, spacing, and distribution of settlements and their economic relationships with their hinterlands.
   d. shows the differences between areas by using colors or shading to represent distinct categories of qualities or quantities.

6. To find the definition of a word used in a book or bound report, you would look in ...

   a. the index
   b. the glossary
   c. the table of contents
   d. the bibliography

7. To find out the sources of information used by an author, you would look in ...

   a. the bibliography
   b. the table of contents
   c. the glossary
   d. the index

8. To find a topic discussed in a book or bound report, you would look in ....

   a. the glossary
   b. the index
   c. the table of contents
   d. the bibliography

9. To find words that are similar in meaning, you would use...

   a. a dictionary
   b. an encyclopedia
   c. an almanac
   d. a thesaurus

10. Which of the following best defines sustainable agriculture?

    a. A form of agriculture with an emphasis on self-support in which crops or livestock are cultivated for personal consumption rather than for sale.
    b. The production of agricultural goods to meet the needs of today without compromising the ability of future generations to meet their needs.
    c. The capacity of a country to balance economic, social, and institutional needs as population and societal needs change over time.

11. Which of the following is <u>not</u> an example of an agricultural best management practice?

    a. unrestricted use of herbicides
    b. contour plowing
    c. integrated pest management
    d. reduction of fertilizer by selective cropping

12. A farmer using integrated pest management would...

    a. use insecticides prior to and during the growing season on a fixed schedule
    b. use a combination of insecticides and herbicides to control pests
    c. use insecticides on a bi-weekly schedule during the growing season
    d. use insecticides when the pest level reaches the threshold limit

13. The objective of the Farmland Preservation Act is to....

    a. protect water resources by limiting environmentally harmful agricultural practices.
    b. help farmers stay in agriculture by providing subsidies for certain crops.
    c. set aside land that will always be used for agricultural purposes.
    d. prevent developers from buying farmland and putting up a mall.

14. Which of the following is the most densely populated county in New Jersey?

    a. Bergen
    b. Hudson
    c. Essex
    d. Passaic

15. Which of the following is the most densely populated state?

    a. New York
    b. California
    c. New Jersey
    d. Delaware

16. Which New Jersey county has no acres in farms?

    a. Bergen
    b. Hudson
    c. Essex
    d. Passaic

17. Population density is ...

    a. the population per square mile
    b. the population per county unit
    c. the populationper square kilometer
    d. the population in a given unit or area

18. A headcount of the population of a country is called ...

    a. a census
    b. a plurality
    c. a vote
    d. a concensus

19. The most profitable agricultural commodity produced in New Jersey is ....

    a. cranberries
    b. tomatoes
    c. horses
    d. chickens

20. The major trading partner for New Jersey agricultural exports is ....

a. Mexico
b. Canada
c. Japan
d. France

True (T) or False (F)

21. ____New Jersey is more densely populated in 1995 than Japan or India.

22. ____The total acreas of land in farms in New Jersey in 1994 is about the same as it was in 1956.

23. ____New Jersey is the largest producer of tomatoes in the United States.

24. ____The population of New Jersey is expected to stop growing by the year 2000.

25. ____The population of every county is New Jersey is expected to increase by the year 2010.

Explain

26. Give one reason why New Jersey should or should not pursue a public policy of farmland preservation. Explain your answer.

Answer Keys to Pre-Test and Post-Test

Pre-Test	Post-Test
1. b	1. a
2. d	2. c
3. a	3. d
4. b	4. d
5. c	5. d
6. c	6. b
7. d	7. a
8. a	8. b
9. c	9. d
10. a	10. b
11. c	11. a
12. b	12. d
13. b	13. c
14. c	14. b
15. d	15. c
16. c	16. b
17. c	17. d
18. d	18. a
19. b	19. c
20. a	20. b
21. F	21. T
22. F	22. F
23. F	23. F
24. T	24. F
25. F	25. F

26. Answers will vary. Accept reasonable answers supported by factual references.

Lesson 1

Where are the people, and why are they there?

Materials

road map of New Jersey
group folders
notebook paper
pens or pencils

Objective

The purpose of this activity is to use a map to answer geographic questions related to the distribution of population in New Jersey. You will be asked to speculate about the reasons for the location of urban settlements and rural settlements. You will be able to confirm your answers as we complete other activities.

Procedure

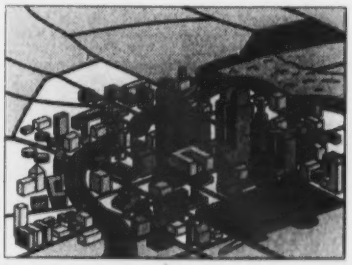
1. Assign the job of recorder to one member of your group.
2. Read the geographic questions.
3. Copy the questions onto a sheet of notebook paper leaving space for answers.
4. Answer the questions.
5. Keep the answers in your group folder. You will need them later.

Questions

1. List the counties that have cities with a population in excess of 10,000.
2. List the counties that have no cities with a population in excess of 10,000.
3. Which county appears to have the least land area?
4. Which county appears to have the greatest land area?
5. Which county appears to be the most densely populated? (Population density in this case is people per square mile.)
6. Which county appears to be the least densely populated?
7. List the five counties you think are the most densely populated.
8. Give reasons for the location of cities in New Jersey.
9. List five counties that you think may have the most acres in farms.
10. Give reasons for the location of farms in New Jersey.
11. What information on the map helped you answer the questions?
12. What other information do you need to confirm your answers?

Lesson 2

Where will the people be?



Materials

data sheets 1 and 2
state maps
colored pencils
group folders
notebook paper
pen or pencil

Objective

You will be using census data and population projections for New Jersey to create chloropleth maps of population distribution in 1990 and 2010. A chloropleth map shows the difference between areas by using colors or shading to represent distinct categories of qualities or quantities.

Procedure

1. Divide your group into two pairs. One pair will create a chloropleth map using the 1990 census data. The other pair will create a chloropleth map using the projected population for 2010.
2. Use the information below to create a legend for your map. Cite the source of the information. Create a title for your map. Color in the map.
3. Answer the questions on a sheet of notebook paper. Place everything in your group folder.

Legend Information

Population	Color
450,000 - 900,000	Red
250,000 - 449,999	Orange
100,000 - 249,999	Green
0 - 99,999	Yellow

Questions

1. List the counties with populations in the range 450,000 - 900,000 in 1990. Which counties will be added to this list by 2010?
2. Which counties are the least populated in 1990? In 2010?
3. Which counties in New Jersey are expected to gain population by 2010?
4. Write a brief paragraph using the vocabulary words in context.

Vocabulary

census
chloropleth map
map

Data Sheet 1

Population of New Jersey Based on 1990 Census Data

County	Population in 1990
Atlantic	224,327
Bergen	825,380
Burlington	395,066
Camden	502,824
Cape May	95,089
Cumberland	138,053
Essex	778,206
Gloucester	230,082
Hudson	553,099
Hunterdon	107,776
Mercer	325,824
Middlesex	671,780
Monmouth	553,124
Morris	421,353
Ocean	433,203
Passaic	453,060
Salem	65,294
Somerset	240,279
Sussex	130,943
Union	493,819
Warren	91,607
State	**7,730,188**

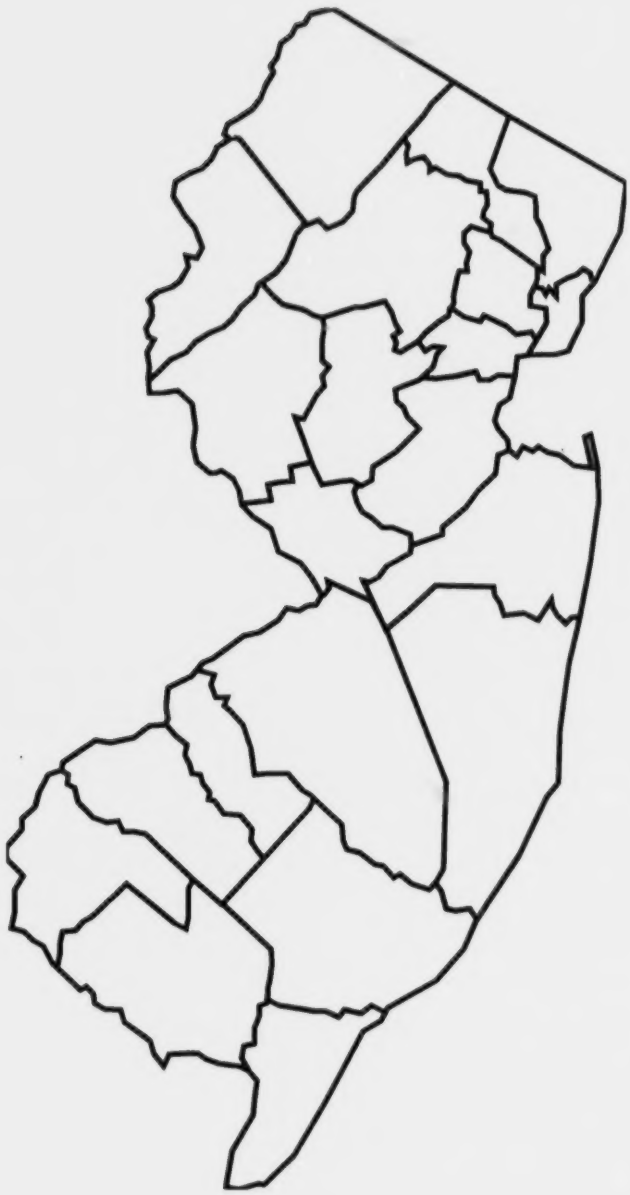
Source: Rutgers University, Center for Urban Policy Research, *Impact Assessment of the New Jersey Interim State Development and Redevelopmnet Plan, Report 1: Research Strategy*, February 15, 1992, pp. 121, 122, 124 (CUPR PREFIT)

Data Sheet 2 *Projected Population of New Jersey in 2010*

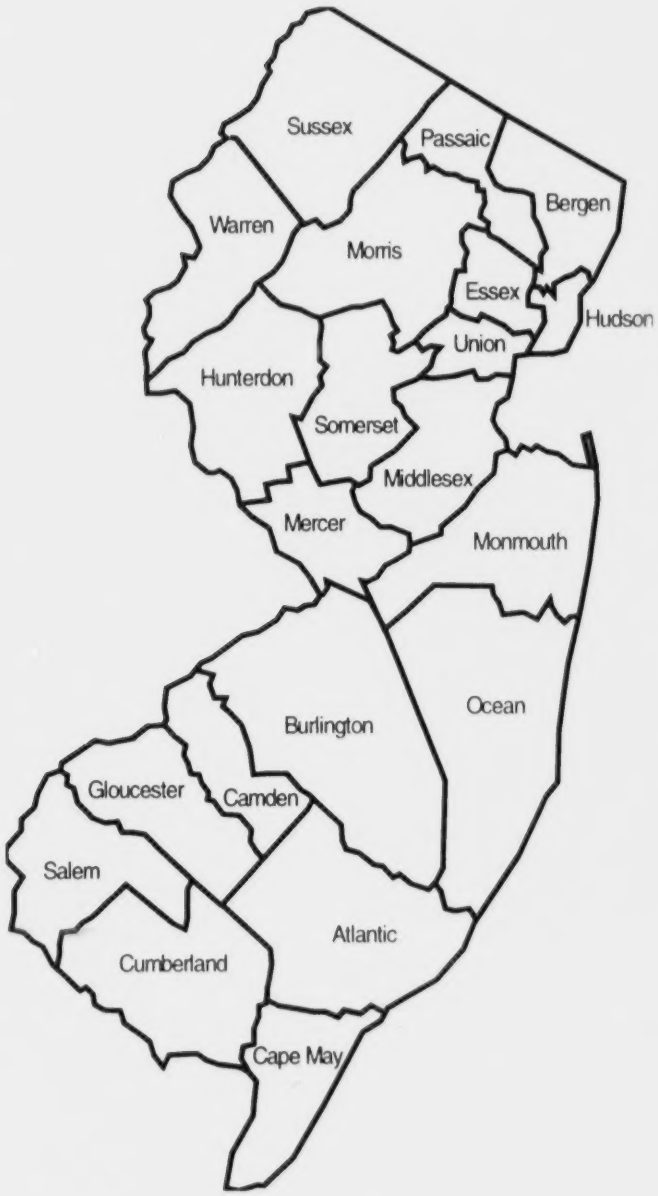
County	Projected Population in 2010
Atlantic	294,500
Bergen	896,400
Burlington	492,400
Camden	597,100
Cape May	130,100
Cumberland	155,700
Essex	662,100
Gloucester	260,200
Hudson	572,600
Hunterdon	132,200
Mercer	409,200
Middlesex	804,200
Monmouth	697,700
Morris	481,800
Ocean	567,700
Passaic	531,200
Salem	69,700
Somerset	286,600
Sussex	165,600
Union	506,900
Warren	102,600
State	**8,816,500**

Source: New Jersey Department of Labor, Division of Planning and Research, Office of Demographic and Economic Analysis, *Population Projections for New Jersey and Counties: 1990 to 2020 Vol 1*, November 1985.

Source: Rutgers University, Center for Urban Policy Research, *Impact Assessment of the New Jersey Interim State Development and Redevelopmnet Plan, Report 1: Research Strategy*, February 15, 1992, pp. 121, 122, 124 (CUPR PREFIT)



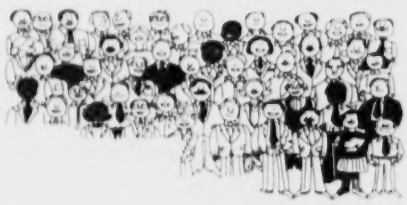
30


Sussex
Passaic
Bergen
Warren
Morris
Essex
Hudson
Union
Hunterdon
Somerset
Middlesex
Mercer
Monmouth
Ocean
Burlington
Gloucester
Camden
Salem
Atlantic
Cumberland
Cape May

31

Lesson 3

How dense is dense?



Materials

state maps
colored pencils
notebook paper
pen or pencil
data sheet 3
group folders

Objective

You will be using population density data to create chloropleth maps of population distribution.

Procedure

1. Divide your group into two pairs. One pair will create a chloropleth map using the 1990 population density data. The other pair will create a chloropleth map using the projected population density for 2010.
2. Use the information below to create a legend for your map. Cite the source of the information. Create a title for your map. Color in the map.
3. Answer the questions on a sheet of notebook paper.
4. Place everything in your group folder.

Legend Information

People per square mile	Color
More than 10,000	Red
2,250 - 9,999	Orange
500 - 2,249	Green
0 - 499	Yellow

Questions

1. Which county is the most densely populated New Jersey county in 1990? 2010?
2. Which counties will change population density categories by 2010? Is this because of an increase or decrease in population?
3. Compare and contrast the chloropleth maps of population to the chloropleth maps of population density. What information does each provide that could answer geographic questions? List geographic questions that can be answered using these maps.
4. Write a short paragraph that explains population density.

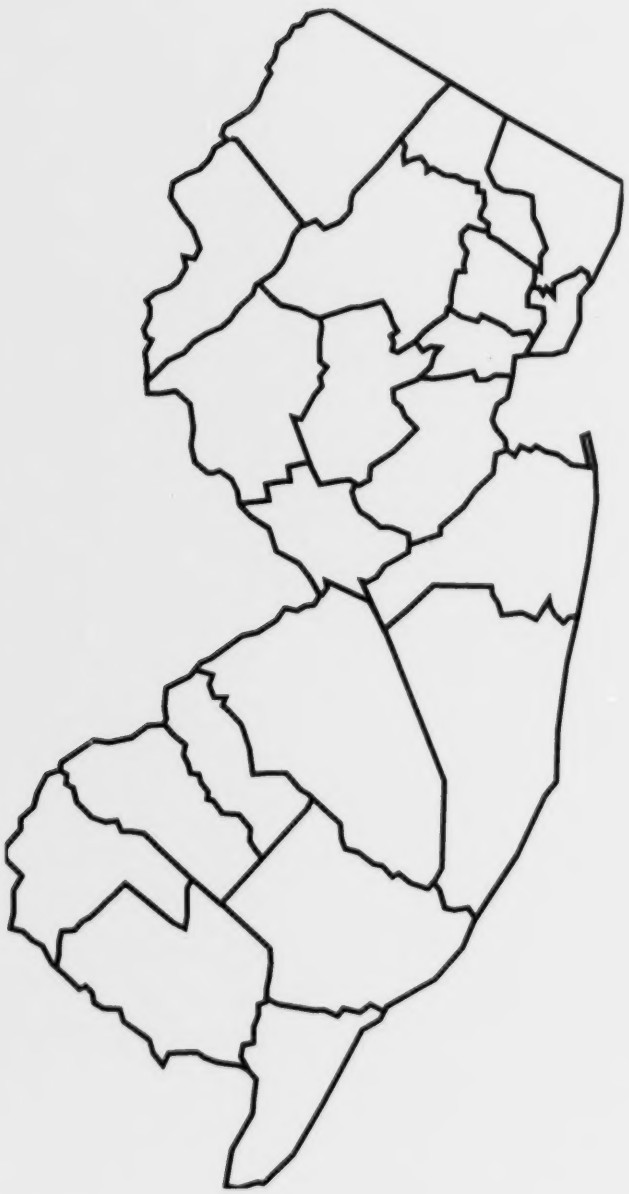
Vocabulary

population density

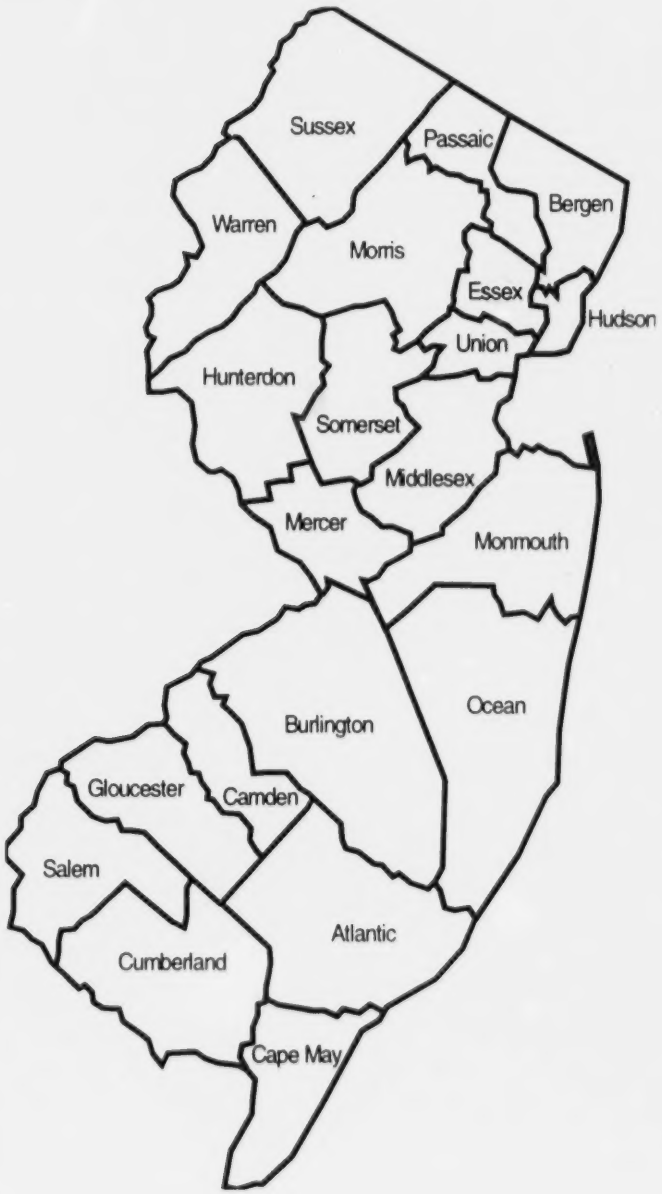
Data Sheet 3 *Population Density by County*

County	Land Area (square miles)	Population Density in 1990 (people/sq mile)	Projected Population Density in 2010 (people/sq mile)
Atlantic	557	403	529
Bergen	230	3,589	3,897
Burlington	808	489	609
Camden	223	2,255	2,678
Cape May	260	366	500
Cumberland	497	278	313
Essex	126	6,176	5,255
Gloucester	326	706	798
Hudson	45	12,291	12,724
Hunterdon	429	251	308
Mercer	223	1,461	1,835
Middlesex	304	2,210	2,645
Monmouth	475	1,164	1,469
Morris	475	887	1,014
Ocean	630	688	901
Passaic	185	2,449	2,871
Salem	342	191	204
Somerset	304	790	943
Sussex	520	252	318
Union	104	4,748	4,874
Warren	356	257	288

Source: Census of Population and Housing, March 1991, New Jersey Department of Labor, State Data Center (as reported by Beryl Robichaud Collins and Karl H. Anderson, *Plant Communities of New Jersey*, New Brunswick, NJ: Rutgers University Press, 1994)



34


Sussex
Passaic
Bergen
Warren
Morris
Essex
Hudson
Union
Hunterdon
Somerset
Middlesex
Mercer
Monmouth
Burlington
Ocean
Gloucester
Camden
Salem
Atlantic
Cumberland
Cape May

Lesson 4

What's a big county?

Materials

pie graph sheets
pencil
protractor
data sheet 4
group folder

Objective

You will be using percentages to create a pie graph representation of population distribution and land area.

Procedure

1. Work in two pairs. One pair will create a pie graph of percentage of population and the other pair will create a pie graph of total land area.
2. Refer to the chloropleth map that you created for population density in 1990 and Data Sheet 4. On a sheet of notebook paper copy and complete the following chart.

Population Density Range	Counties Included in the Range	Percentage of Population 1990	Percentage of Total Land Area 1990
More than 10,000 (Red Counties) Range total			
2,250 to 9,999 (Orange Counties) Range total			
500 to 2,249 (Green Counties) Range total			
0 to 499 (Yellow Counties) Range total			

To find the range total, add together the percentages for each county in the color range.

3. Graph the range totals. Color each section of the pie graph to match the colors that you used for each range category on the chloropleth maps.
4. What information do the pie graphs provide that the chloropleth map does not?

Vocabulary

pie graph

36

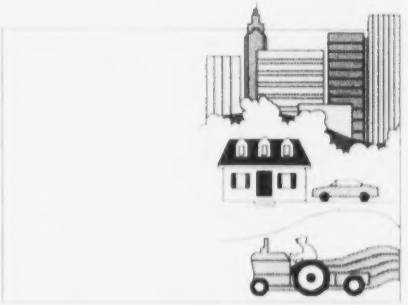
Data Sheet 4 *Percentages of Population and Land Area by County*

County	Percentage of Population in 1990	Percentage of Land Area in 1990
Atlantic	2.9	7.5
Bergen	10.7	3.1
Burlington	5.1	10.9
Camden	6.5	3.0
Cape May	1.2	3.5
Cumberland	1.8	6.7
Essex	10.1	1.7
Gloucester	3.0	4.4
Hudson	7.2	0.6
Hunterdon	1.4	5.8
Mercer	4.2	3.0
Middlesex	8.7	4.1
Monmouth	7.2	6.4
Morris	5.5	6.4
Ocean	5.6	8.5
Passaic	5.9	2.5
Salem	0.8	4.6
Somerset	3.1	4.1
Sussex	1.7	7.0
Union	6.4	1.4
Warren	1.2	4.8

Source: Census of Population and Housing, March 1991, New Jersey Department of Labor, State Data Center (as reported by Beryl Robichaud Collins and Karl H. Anderson, *Plant Communities of New Jersey*, New Brunswick, NJ: Rutgers University Press, 1994)

Lesson 5

What's growing in the Garden State?



Materials

data sheet 5
reading
graph paper
pencil
ruler
notebook paper
state maps
group folder

Objective

You will use population data to create a line graph showing population trends in New Jersey.

Procedure

1. You will be working in pairs.
2. Follow the directions on Data Sheet 5.
3. Answer the questions on a sheet of notebook paper.
4. Place the graph and answers to the questions in your group folder.

Questions

1. Doubling time is a term used to describe the time interval needed for a population to double in size. How often does the population of New Jersey double? Using your answer, what will the population of New Jersey be in 2050?
2. What information does the line graph provide that isn't shown on a chloropleth map?
3. When would you use a line graph? When would you use a chloropleth map? When would you use a pie graph?

Supplemental Reading

Read the brief population history of New Jersey titled *The Population Trend.* Discuss the information then write a paragraph describing New Jersey in the next fifty years.

Vocabulary

line graph

Reading

The Population Trend

Europeans arrived in New Jersey by ship and boat. They tended to settle first along navigable rivers. The Delaware River on the west and Hudson River on the east were the location of the first settlements by the Dutch, Swedes and English. Although Dutch settlements had been established in the early 1620s, European colonization began in earnest when England claimed the land in 1664. Later settlements followed the smaller rivers with development first in the Hackensack, Passaic, and Raritan River valleys. Hostile Iroquois prevented early settlement of the Kittatinny Valley.

Since agriculture was the primary activity of New Jersey's early settlers, villages, towns, and later cities grew up around the first farming communities. Soil in the Ridge and Valley, Highlands, Pine Barrens, and edge of the Outer Coastal Plain did not support agriculture as efficiently as the soils of the Piedmont and Inner Coastal Plain. A chloropleth map of New Jersey using census data from 1784, would show population heaviest in what is now known as Bergen, Essex, and Hudson counties.

New Jersey's vast forests were vital to sustaining a growing population. The need for charcoal was met by clearing over 200,000 acres of forest by 1885. Iron ore mining in the Pine Barrens and Highlands drew population into the central and northern counties of New Jersey. As iron ore was exhausted in New Jersey, mining operations closed down and moved west leaving behind ghost towns and devastated ecosystems in the Pine Barrens and Highlands. The use of anthracite coal instead of charcoal diminished the demand for New Jersey wood. It would take nearly 100 years for the forests of New Jersey to recover.

With decreasing reliance on waterways for transportation and the advent of rail travel and roadway development, people began to spread out in New Jersey. However, most of the population of New Jersey tended to remain in the Piedmont and Delaware Valley regions.

Today the seven counties bordering New York City offer easy commutes to jobs in the city by mass transit. Someone living in Bergen, Passaic, Hudson, Essex, Union, Monmouth, or Middlesex counties can enjoy the benefits of one of the largest cities in the world while being able to return home to a more suburban lifestyle. Many communities around New York City were called "bedroom communities" because people worked in Manhattan and slept in New Jersey. According to the 1990 census, 56.2% of New Jerseyans lived in the seven counties around New York City. About 4.3 million people lived on about 20% of the land.

Philadelphia forms the hub of New Jersey's other population concentration in Camden County with 6.5 % of the people living on 3% of the land. Trenton, the

capitol of New Jersey, forms the center of the Mercer County population with 4.2% of the state's population on 3% of the land.

As you have seen from the chloropleth maps of New Jersey for the year 2010, the population is expected to spread into the Highlands and traditional agricultural areas of central and southern New Jersey. This will mean new roads, increased demands for water, sewer service, solid waste handling, and additional stress on environmentally sensitive forest and wetland areas.

Summary of Population Trends in New Jersey

Dates	Development Activity	Population Trend in New Jersey
1770-1840	agriculture	population grows at half the national rate
1840-1890	industry begins to grow	population grows at or above national rate
1890-1930	increased industrialization	population grows at 1.5% of national rate
1945-1970	suburbs form after Depression ends	population grows at 1.35 to 1.5% of national rate
1970-1990	stagnation	population growth falls below national rate

Data Sheet 5 *Population of New Jersey 1726 - 2010*

Year (X-axis)	Total Population (Y-axis)
Pre-1726	8,000
1726	32,442
1784	149,435
1850	489,000
1900	2,000,000
1950	4,000,000
1990	7,730,000
2010	8,820,000

Instructions Display the information listed in the table as a line graph.

1. Label the y and x axis.
2. Title the graph.
3. Cite the information sources on the graph.
4. Be prepared to explain why you chose the graphing intervals.

Assessment Criteria

1. Neatness and clarity of graph.
2. Completion of required elements listed above.
3. Logical reasoning used to select the graphing intervals.

Original Sources: Data for 1726 to 1950 from John Brush, *The Population of New Jersey*, New Brunswick, NJ: Rutgers University Press, 1956. Data for later years from the NJ Department of Labor, State Data Center (as reported by Beryl Robichaud Collins and Karl H. Anderson, *Plant Communities of New Jersey*, New Brunswick, NJ: Rutgers University Press, 1994)

Lesson 6

Where are the farms?

Materials

state maps
colored pencils
data sheet 6
notebook paper
group folder
graph paper
pen or pencil

Objective

You will use farm census data to create a chloropleth map of acres of land in farms in 1992 and to create a bar graph comparison of acres of land in farms in 1987 to acres of land in farms in 1992.

Procedure

1. Work in two pairs. One pair should complete a chloropleth map of the acres of land in farms in 1992. Include a title, legend, and source citation on each map. The other pair should create a bar graph comparing acres of land in farms in 1987 to 1992.
2. Answer the questions on a sheet of notebook paper. Place all work in the group folder.

Map Legend Information

Acres of Land in Farms	Color
20,000 - 120,000	Red
10,000 - 19,999	Orange
1 - 9,999	Green
0	Yellow

Percentage Change =

$$\frac{\text{1992 Acres - 1987 Acres}}{\text{1987 Acres}}$$

(times 100 for %)

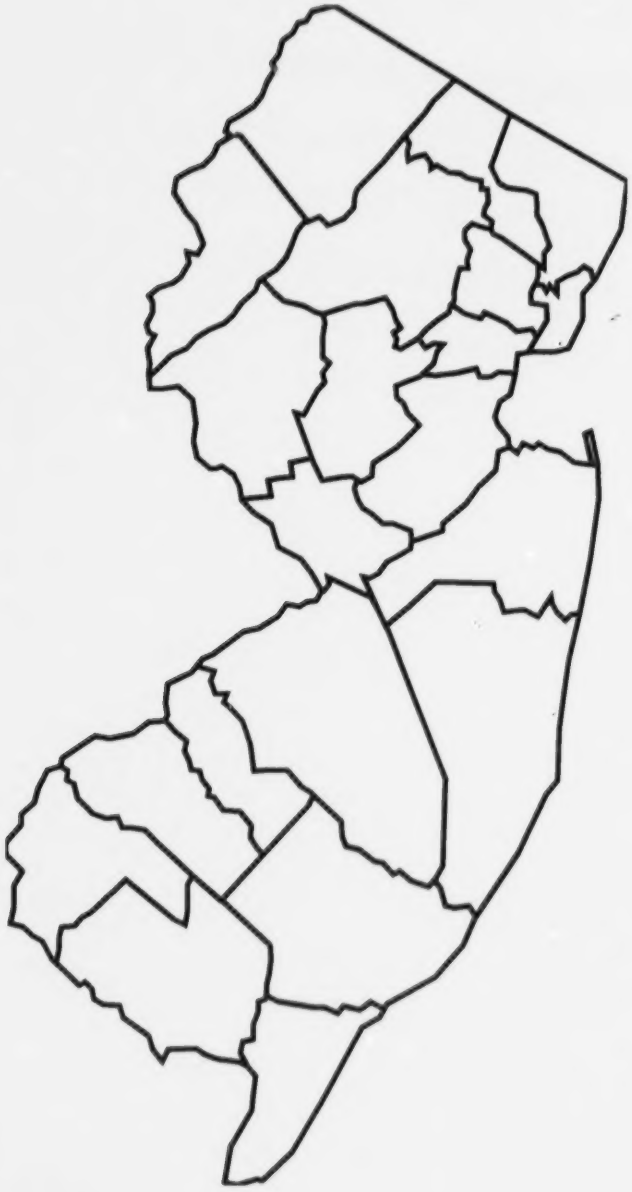
Questions

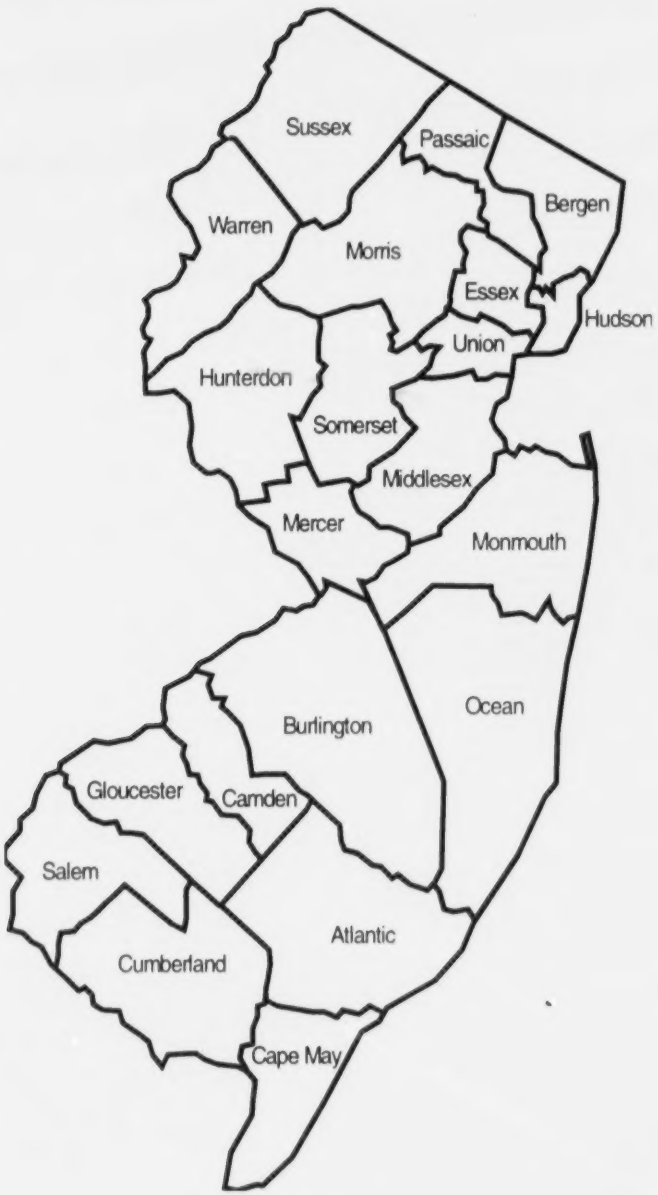
1. Which counties gained farm acreage in 1992?
2. Which counties lost farm acreage in 1992?
3. Which county has no acreage in farms?
4. Compare the chloropleth map of Acres of Land in Farms to the chloropleth map of Population Density in 1990. What patterns do you see?
5. Based on the chloropleth map of Population Density in 2010, predict which counties will lose acres of land in farm by 2010.
6. Use the formula to calculate the percentage change for each county and the total.
7. Review your answers to questions answered during lesson 1. Answer the questions again based on your research. What information did you need to accurately answer the questions?

Data Sheet 6 *Land in Farms*

County	Acres of Land in Farms 1987	Acres of Land in Farms 1992	Percentage Change
Atlantic	29,423	29,606	
Bergen	2,596	2,636	
Burlington	103,244	97,186	
Camden	10,033	7,799	
Cape May	13,553	11,644	
Cumberland	72,406	68,627	
Essex	580	613	
Gloucester	62,128	61,748	
Hudson	0	0	
Hunterdon	123,698	106,324	
Mercer	41,303	35,786	
Middlesex	25,222	25,022	
Monmouth	65,846	58,753	
Morris	27,086	23,915	
Ocean	8,820	10,365	
Passaic	1,380	1,838	
Salem	95,265	98,256	
Somerset	45,190	43,989	
Sussex	78,641	75,531	
Union	449	325	
Warren	87,583	87,638	
Total	**894,426**	**847,595**	

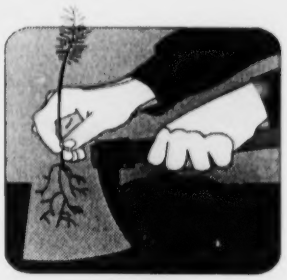
Source: 1992 Census of Agriculture, U.S. Department of Commerce, Washington, DC




Sussex
Passaic
Bergen
Warren
Morris
Essex
Hudson
Union
Hunterdon
Somerset
Middlesex
Mercer
Monmouth
Ocean
Burlington
Gloucester
Camden
Salem
Atlantic
Cumberland
Cape May

Lesson 7

How are soils, bedrock and farms related?



Materials

reading
bedrock map
soil map
state map
acetate sheet with soil map photocopied onto it
group folder
notebook paper
markers
pen or pencil

Objective

You will use an acetate overlay of the soil map. By comparing the overlays to the bedrock map, you will be able to explain the relationship between soil type and the parent rock. You will infer the relationship between the location of farms in New Jersey and the soil type.

Procedure

1. Place the overlay of the soil map onto the bedrock map. Use the key to discover relationships between the soil type and bedrock type. The major components of soil are loam, clay, sand, silt, and rocks. Loam is rich in organic material. Water does not flow through clay. Sand is loose and drains well. Silt is fine soil deposited from run-off.

Questions

1. Describe the relationships between soil and bedrock that you observe.
2. What type of soil seems to be most common in farming counties?
3. Why is a knowledge of soil type important to a farmer? A land developer?
4. A large underground freshwater supply called an aquifer is found in southern New Jersey. How can its location be explained by the soil and bedrock found there?
5. Using an acetate overlay to combine map information from different databases is a technique called geographic information systems. Computer programs can be used to store information in a database that can be added to a map to demonstrate relationships. If you were creating a management plan for the state of New Jersey, what information would you need to create a map to show land use now and in the future (consider human and natural needs)?

Vocabulary

soil
geographic information systems (GIS)

Reading

A Geologic History of New Jersey

During the late 1980s, New Jersey's tourism slogan was "New Jersey's Got It!" That statement can certainly be made about the geology of New Jersey. The Reading Prong of the Green Mountains extends across the northwestern corner of New Jersey. These granite mountains are remnants of the majestic peaks that stood there more than 570 million years ago. Formed by uplift in the Precambrian days of Earth, these mountains are a source of some of the oldest rocks in the world. Millions of years of geologic events such as ocean cover and glacial pressure have added sedimentary and metamorphic rocks to the regions known as the Ridge and Valley and Highlands.

New Jersey was on the leading edge of the continental crash with Africa and Europe during the Paleozoic Era. As Pangea broke up during the Cretaceous Period of the Mesozoic Era, New Jersey formed the back edge of the moving land mass that would become North America. Water washed over New Jersey leaving behind sedimentary rocks in the Outer Coastal Plain. Volcanic activity deposited basaltic and diabase rocks into the brownstone and shale formations of the Piedmont. Erosion of the softer rocks created the rolling hills and valleys of the "Foot-of-the-Mountain" (Piedmont) region. Swamps, lakes, and wetlands supported lush vegetation in the Inner Coastal Plain and left behind the limestone-rich marl of this region.

New Jersey's modern day relief is due in part to three glacial periods, the Kansan, Illinoian and Wisconsin glaciations. Rocks were pushed ahead of the glacier forming a moraine (huge pile of rock) or carried along by water from the later melting of the glaciers leaving behind glacial till (ground up rock). The glaciers moved the Hudson River to its present location, sculpted the Passaic and Hackensack Rivers, and scoured the Outer Coastal Plain with glacial till.

Soil Types

Soil types can be generalized as organic, loamy, clayey, silty, sandy, stony or a combination. Loams and organics float on the surface of water. Clay is oily and tightly compact. It doesn't allow water to drain easily. Silt is a fine flour-like soil most often associated with erosion into waterways. Sand is finely ground rock and stones are small pieces of rock. If you were to mix about a 1/2 cup of soil into a clean spaghetti sauce jar with about 1 cup of water, the soil would settle by density. The bottom layer would be heavier pebbles and the next layers sand, silt, and clay under the water. Floating on top of the water would be loam and organic matter. Not all soil samples have all the components. Soils are named based on their dominant constituent. For example, sandy loam would be predominately sand with loam. Soils can also vary in their pH. Some soils are acidic (less than pH 7) while others are neutral (pH 7) or alkaline (more than pH 7). Nitrogen, phosphate, and potash content affect the quality of agricultural products. Farmers must frequently add these chemicals to soil that is used for agriculture. Most of

the nitrogen entering the ecosystem today is from an artificial source due to its widespread use in fertilizers. This is a major concern for environmentalists since the nitrogen must be manufactured and when it enters the ecosystem it may enter in excessive amounts disrupting the natural nitrogen cycle.

Soil and Parent Rock

Soil is formed by the erosion of rocks and the decomposition of organic material. In general, the top layer of soil is richest in organic matter. The second layer of soil may be a mixture of minerals and particles of rocks deposited by wind and water. The deepest layer of soil is most closely related to the underlying bedrock and is usually formed of particles worn away from the surface of the bedrock. Just as the bedrock varies in New Jersey depending on whether it was formed from deep in the Earth (igneous), by the forces of weathering and erosion (sedimentary), or through chemical changes associated with pressure (metamorphic), soil around New Jersey varies from rich and organic to poor and sandy.

Ridge and Valley

The Ridge and Valley section of New Jersey covers about 635 square miles which is 8.5% of the land area of New Jersey. Because the Ridge and Valley section is a combination of igneous and sedimentary rock, soil quality varies with elevation. The exposed ridges are nearly bare of soil and the underlying bedrock is clearly visible as long ridges. The soil on the ridges tends to be thin and acidic. It is poor quality soil for agriculture and supports mostly grasses and shrubs. Soil in the valleys was formed by the action of the glaciers. It comes from limestone and shale and varies from sandy loam to loam. These soils are rich, well drained, and good for agriculture. The slope of the land in the Ridge and Valley region requires farmers to utilize soil conservation methods to ensure that the rich top soil is not lost through erosion.

Highlands

The New Jersey Highlands cover about 900 square miles or 12% of New Jersey total land area. When granite undergoes metamorphosis it becomes gneiss (pronounced like "nice"). In the Highlands, ancient granite and gneiss form most of the bedrock of the region. The valleys though contain limestone and shale. The type of soil in the Highlands depends directly on what happened to the rock as the result of the glaciations. The northern highlands are primarily stony loams while the southern highlands are stony sandy loams. The highland soils have not been historically important for agriculture. They do support an extremely important system of forests that have grown back since the beginning of the 1900s.

Piedmont

About 20% of New Jersey's land area is found in the 1500 square miles of rolling hills and flatland known as the Piedmont Plateau. Glacial deposits, erosion-resistant volcanic formations, and shale and sandstone make the region's soil extremely varied. In areas above the brownstone (a type of sandstone), the soil is red and acidic. Along coastal wetlands and marshes, the soil can contain clay,

loam, and sand. For the most part, so much development has taken place in the Piedmont that it is no longer an agriculturally important region of New Jersey.

Inner and Outer Coastal Plains

The southern 60% of New Jersey's land area is in the Inner and Outer Coastal Plains. The Inner Coastal Plain is older than the Outer Coastal Plain. Soils of the Inner Coastal Plain (1,075 square miles) date from the Cretaceous Period with a covering of glacial deposits of the Pleistocene. The larger (3,400 square miles) Outer Coastal Plain consists of glacial sand and gravel deposits over Tertiary sedimentary bedrock. Marl found along the Inner Coastal Plain is rich in glauconite. It was mined as a fertilizer during the 1800s. It is here that New Jersey's best dinosaur and Cretaceous fossils are found. The Pine Barrens (also known as the Pinelands–2,000 square miles) support a valuable natural ecosystem, but the soil is so sandy that it is unsuitable for agriculture. The well-drained, acidic, sandy soils of the Inner and Outer Coastal Plains support a wide variety of crops. The wetlands needed for cranberry farming are located along the Outer Coastal Plain.

Watersheds, Bedrock, and Soil

The igneous and metamorphic bedrock typical of the Ridge and Valley and Highlands regions are impervious to water. That means that water does not go into the rock, but rather runs off. The steep slopes of these regions form an important watershed that serves millions of New Jersey residents in the Piedmont. Glaciers sculpted out natural lakes and reservoirs. Rivers run downhill wrapping around the terminal moraine left by the last glacier. Humans have created reservoirs by damming the rivers. Surface water is the most important source of water in most of northern New Jersey.

Southern New Jersey is geologically very different from northern New Jersey. The sandy soils and unconsolidated bedrock (not stuck together tightly) let water percolate (drip) through to underground wells and aquifers. One of the largest aquifers in the northeast lies under southern New Jersey. It is a delicate aquasystem. If too much water is removed, salts from the soil and rock begin to concentrate causing the freshwater to become salty. This is known as saltwater intrusion. Wells and artificial ponds are significant sources of water for the irrigation needed for agriculture in southern New Jersey. Increasing development in southern New Jersey will increase demand for water from the aquifer. As water is drawn out of the aquifer, seawater is drawn in at the coastal edges. This is called salt water intrusion. Salt water intrusion is already an environmental problem in Cape May.

SEDIMENTARY ROCKS

CENOZOIC

a Holocene: *beach and estuarine deposits*

b Tertiary: *sand, silt, clay*

MESOZOIC

c Cretaceous: *sand, silt, clay*

d Jurassic: *siltstone, shale sandstone, conglomerate*

e Triassic: *siltstone, shale sandstone, conglomerate*

PALEOZOIC

f Devonian: *conglomerate, sandstone, shale, limestone*

g Silurian: *conglomerate, sandstone, shale, limestone*

h Ordovician: *shale, limestone*

i Cambrian: *limestone, sandstone*

IGNEOUS AND METAMORPHIC ROCKS

MESOZOIC

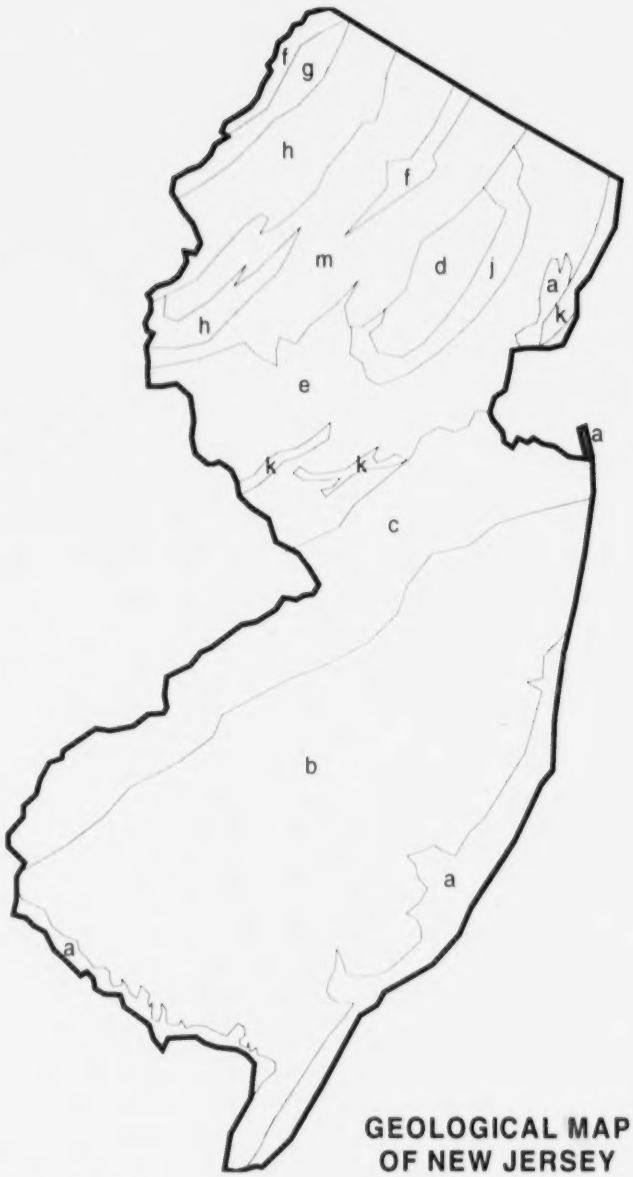
j Jurassic: *basalt*

k Jurassic: *diabase*

PRECAMBRIAN

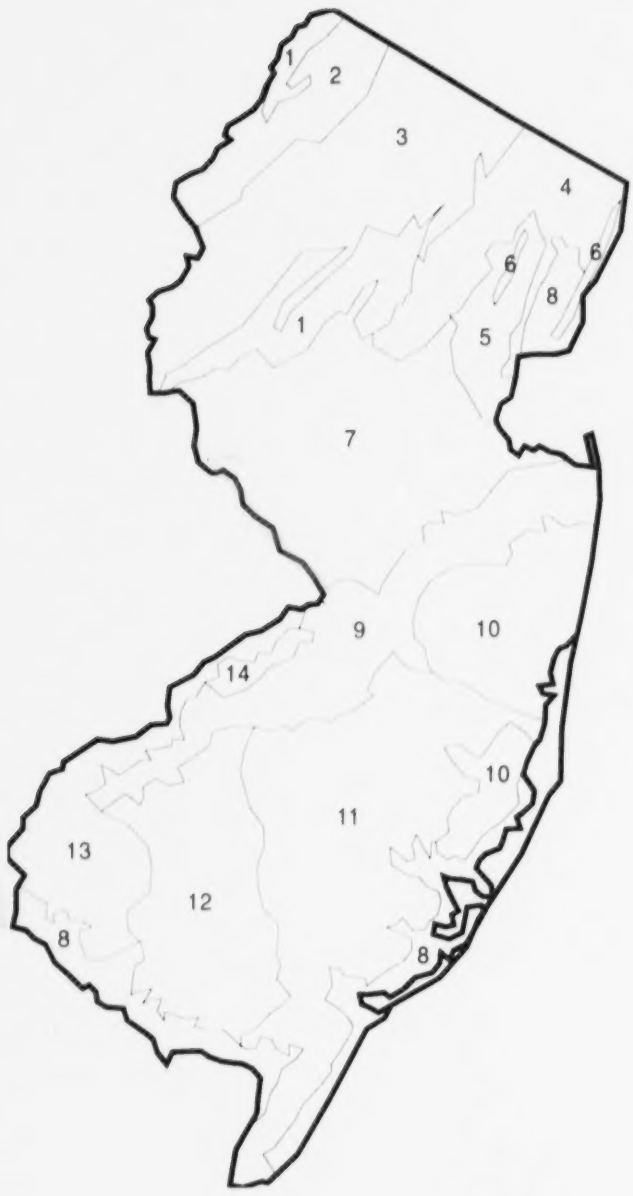
l *marble*

m *gneiss, granite*



GEOLOGICAL MAP OF NEW JERSEY

50



SOILS OF NEW JERSEY

1 stoney-sandy loam, well drained

2 stoney loam, well drained

3 stoney loam, poorly drained

4 sandy loam, well drained

5 silty loam, well to poorly drained

6 gravelly loam, moderately drained

7 acidic-sandy loam & silty loam well drained

8 tidal mud/sand flats, well to poorly drained

9 rich organic loam, poorly to moderately drained

10 sandy, well drained

11 mucks, organic loam, sandy loam, bogs, mixed drainage (includes Pine Barrens)

12 loam, bogs, & gravel, well drained

13 silt, organic loams, poor to moderately drained

14 loamy, sandy soil, moderately drained

51

Lesson 8

What puts the green in Garden State farming?

Materials

graph paper
colored pencils
notebook paper
data sheets 7 - 12
pencil or pen
ruler
group folder

Objective

You will use a pictogram to display numerical data regarding the top five commodities produced in New Jersey based on cash receipts. You will use a bar graph to compare the commodity category totals.

Procedure

1. Work in two pairs. One pair will create a pictogram showing the top five commodities produced in New Jersey in 1994 based on cash receipts. Select the specific commodities. Do not use the "All" or "Total" categories.
2. The other pair will create a bar graph to compare the category totals (e.g., All livestock and products, All field crops, All vegetables, All fruits and berries, and Greenhouse, nursery, sod, and mushrooms).
3. Use the 1994 data from data sheet 7.
4. Answer the questions.

Questions

1. List the top 10 commodities based on cash receipts in 1994.
2. Use the commodity data sheet 8 to identify the counties where the commodities are grown. List the counties that are the major producers of the top 10 commodities. Do you see any patterns related to soil types discovered in Lesson 7? How would you display this information?
3. Use the maps and graphs that you have already created to forecast the effect of population changes in these counties on the production of commodities in 2010.
4. Refer to data sheets 9 and 10. Describe the effect on United States commodities exports if New Jersey continues to lose farmland. Use the report and other references to find out which countries are primary trading partners for New Jersey agricultural products.
5. Compare and contrast bar graphs and pictograms. Give examples of when you would use each type of graph and why.

Vocabulary

bar graph
pictogram

Data Sheet 7 *Cash Receipts From New Jersey Farm Marketings by Commodity, 1989-1994 ($1000)*

Commodity	1989	1990	1991	1992	1993	Prelim '94
Eggs	26,948	31,308	33,961	30,042	33,313	26,684
Turkeys	2,269	1,926	1,393	1,383	1,685	1,734
Other Poultry	2,347	1,728	2,201	1,245	1,600	1,468
All Poultry and Eggs	31,564	34,962	37,555	32,670	36,598	29,886
Dairy	51,340	53,244	48,860	48,576	48,465	46,644
Cattle and Calves	16,721	14,721	14,620	15,460	16,206	11,355
Hogs	1,527	1,641	1,288	1,142	1,820	1,479
Horses (excludes purse & stake payments)	93,345	88,678	87,949	92,348	92,000	91,000
Other Livestock	2,831	2,419	2,305	2,009	2,220	2,200
All Livestock (except poultry)	165,764	160,703	155,022	159,535	160,711	152,678
All Livestock and Products	**197,328**	**195,665**	**192,577**	**192,205**	**197,309**	**182,564**
Corn	10,478	13,746	13,665	11,636	10,799	10,885
Wheat	5,113	3,549	2,910	3,864	3,901	4,150
Hay	9,560	9,138	6,858	7,365	6,606	6,404
Soybeans	20,317	22,299	23,291	22,198	24,346	25,607
Potatoes	7,738	8,988	5,472	4,779	3,781	3,646
Sweet Potatoes	3,603	3,290	3,539	3,377	3,069	2,527
Other Field Crops	2,826	3,302	4,954	5,959	5,012	5,712
All Field Crops	**59,635**	**64,712**	**60,689**	**59,178**	**57,514**	**58,931**
Tomatoes	13,454	16,733	12,480	21,420	18,896	28,863
Sweet Corn	9,487	10,448	11,718	11,826	15,884	12,929
Lettuce	4,528	3,985	7,578	7,183	10,922	15,869
Asparagus	2,462	2,176	1,822	2,530	2,323	1,764
Peppers	11,134	10,886	11,160	13,603	21,794	44,975
Cabbage	9,185	6,334	9,290	4,352	8,050	7,797
Snap Beans	5,197	4,640	2,749	4,010	6,759	4,182
Cucumbers	3,749	4,060	3,891	8,536	7,909	8,260
Spinage	4,241	4,399	4,650	4,302	4,878	5,288
Escarole	3,039	2,968	2,508	2,843	3,269	2,640
Eggplant	2,803	2,188	3,269	3,240	4,646	5,280
Vegetables for Processing	5,802	9,526	8,289	6,494	5,778	6,599
Miscellaneous Vegetables	25,697	24,442	37,247	41,149	42,470	44,396
All Vegetables	**100,778**	**102,785**	**116,651**	**131,488**	**153,578**	**188,842**
Peaches	22,512	15,324	27,324	25,500	25,288	22,685
Apples	4,974	5,011	9,718	7,388	11,771	9,568
Blueberries	24,560	19,435	24,235	21,820	25,005	23,205
Strawberries	1,258	1,838	1,273	1,685	1,539	759
Cranberries	11,972	14,535	15,598	23,326	18,219	26,432
Other Fruit and Berries	708	720	1,102	1,001	1,378	1,345
All Fruits and Berries	**65,984**	**56,863**	**79,250**	**80,720**	**83,200**	**83,9943**
Greenhse-nursery-sod-mushrooms	**235,856**	**228,787**	**204,009**	**181,755**	**208,084**	**254,074**
All Crops	**462,253**	**453,147**	**460,599**	**453,141**	**502,376**	**585,841**
ALL COMMODITIES	**659,581**	**648,812**	**653,176**	**645,346**	**699,685**	**768,405**

Source: New Jersey Department of Agriculture, *New Jersey Agriculture, 1995.*

Data Sheet 8 *Rank of New Jersey Counties for Selected Items, 1994*

Item	1st	2nd	3rd	4th	5th
Field crop production					
Corn for grain	Warren	Hunterdon	Salem	Burlington	Mercer
Wheat for grain	Cumberland	Salem	Hunterdon	Burlington	Gloscester
Barley for grain	Salem	Cumberland	Burlington	Gloucester	Monmouth
All Hay	Hunterdon	Warren	Sussex	Somerset	Burlington
Soybeans for beans	Salem	Burlington	Cumberland	Gloucester	Middleses
Potatoes	Salem	Cumberland	—	—	—
Sweet potatoes	Gloucester	Atlantic	Camden	—	—
Vegetable (harvested)					
Asparagus	Gloucester	Salem	Cumberland [1]	Burlington [1]	—
Cabbage	Cumberland	Atlantic	Gloucester	Monmouth [2]	Salem [2]
Lettuce	Cumberland	Atlantic	Warren	Gloucester	—
Peppers	Gloucester	Salem	Cumberland	Atlantic	Monmouth
Sweet Corn	Burlington	Salem	Gloucester	Monmouth [2]	Sussex [2]
Tomatoes	Gloucester	Salem	Burlington	Cumberland	Monmouth
Fruit and berries					
Apples (commercial)	Gloucester	Atlantic	Burlington	Cumberland	Camden [3]
Peach production	Gloucester	Cumberland	Camden	Atlantic	Burlington
Blueberry production	Atlantic	Burlington	—	—	—
Cranberries	Burlington	—	—	—	—
Certified nurseries					
Nursery acreage	Monmouth	Cumberland	Burlington	Gloucester	Middlesex
Number of nurseries	Monmouth	Cumberland	Gloucester	Burlington	Hunterdon
Livestock & products					
Milk production	Warren	Salem	Sussex	Hunterdon	Burlington
# cattle & calves	Warren	Sussex	Salem	Hunterdon	Burlington
# sheep & lambs	Hunterdon	Sussex	Somerset	Warren	Salem [3]
# hogs & pigs	Gloucester	Salem	Hunterdon	Cape May	Burlington
Horses	Monmouth	Middlesex	Salem	Gloucester	Atlantic

[1] Tied for 3rd

[2] Tied for 4th

[3] Tied for 5th

Source: New Jersey Department of Agriculture, *New Jersey Agriculture, 1995.*

Data Sheet 9 *Rank of US States for Selected Items 1994*

Item	1st	2nd	3rd	4th	5th
Crop production					
Cranberries	Massachusetts	Wisconson	**New Jersey**	Oregon	Washington
Blueberries	Michigan	**New Jersey**	Oregon	North Carolina	Washington
Peaches, Freestone	California	South Carolina	Georgia	**New Jersey**	North Carolina
Peppers, Bell	Flordia	California	**New Jersey**	Texas	Michigan
Head Lettuce	California	Arizonia	Florida	Colorado	**New Jersey**
Value					
Average value of farmland and buildings per acre [1]	Rhode Island	**New Jersey**	Connecticut	Massachusetts	Maryland
Taxes					
Average tax per acre of agricultural land	Rhode Island	**New Jersey**	Michigan	Connecticut	Massachusetts

[1] Data relate to January 1, 1995

Source: New Jersey Department of Agriculture, *New Jersey Agriculture, 1995*.

Data Sheet 10 *New Jersey and United States*

Value of Export Shares of Agricultural Commodities

Fiscal Year 1989-1994 ($1,000,000)

Commodity Group	1989	1990	1991	1992	1993	1994
Soybeans and soybean products	10.4	10.0	9.8	13.5	11.8	12.9
Fruits and preparations	9.0	6.9	5.3	9.8	6.4	7.8
Vegetables and preparations	7.1	5.0	10.1	9.6	13.9	13.8
Animals, meats and products	11.8	6.5	2.5	2.7	2.7	2.3
Dairy products	3.9	3.0	2.4	5.1	2.7	3.5
Other	56.0	58.3	67.3	70.3	75.1	82.6
Total New Jersey[1]	**98.2**	**89.7**	**97.3**	**111.0**	**112.6**	**122.9**
Grain and feeds	16,693.7	15,375.4	11,797.8	13,410.2	13,520.4	12,477.0
Soybeans and soybean products	5,822.0	5,326.1	4,715.6	6,040.2	6,114.6	5,642.6
Fruits and preparations	1,800.2	2,187.0	2,424.2	2,785.7	2,712.5	3,005.3
Vegetables and preparations	1,542.3	2,078.8	2,596.9	2,789.8	3,220.1	3,489.4
Animals, meats and products[2]	4,543.2	4,644.5	4,805.6	5,175.7	5,033.1	5,452.0
Poultry and products	721.2	901.8	1,003.9	1,192.4	1,313.2	1,717.7
Dairy products	474.7	358.0	293.4	641.2	761.8	708.6
Other	8,013.4	9,348.0	9,971.8	10,394.6	9,913.7	11,018.3
Total United States	**39,610.7**	**40,219.6**	**37,609.2**	**42,429.8**	**42,589.4**	**43,510.9**

[1] The export shares for New Jersey were derived from the State's contribution to national output. They do not show actual State exports, but instead reflect the prorated stake in the national export total.

[2] Includes hides, skins and mink pelts, excludes poultry.

Source: Foreign Agricultural Trade of the United States (March/April), USDA, Economic Research Service.

Data Sheet 11 *New Jersey Farm Statistics*

Average Farm Size (Acres) (1992 Census of Agriculture)	
1 to 99	77.4%
100 to 499	18.8%
500 to 999	2.8%
1,000 to 1,999	0.8%
2,000 or more	0.2%

Percent of 1992 Employment in Farm and Farm Related Jobs	
Production	0.5%
Farm Inputs	0.1%
Processing and Marketing	1.8%
Wholesale and Retail	9.6%
Total	**12.5%**

Farm Organization		
Individuals/Family Corporations	8,261	91.0%
Partnerships	688	7.4%
Non-Family Corporations	72	0.8%
Others	78	0.9%
Average Operator Age (years)	54 years old	
Percent with Farming as the Principal Occupation	46.5%	

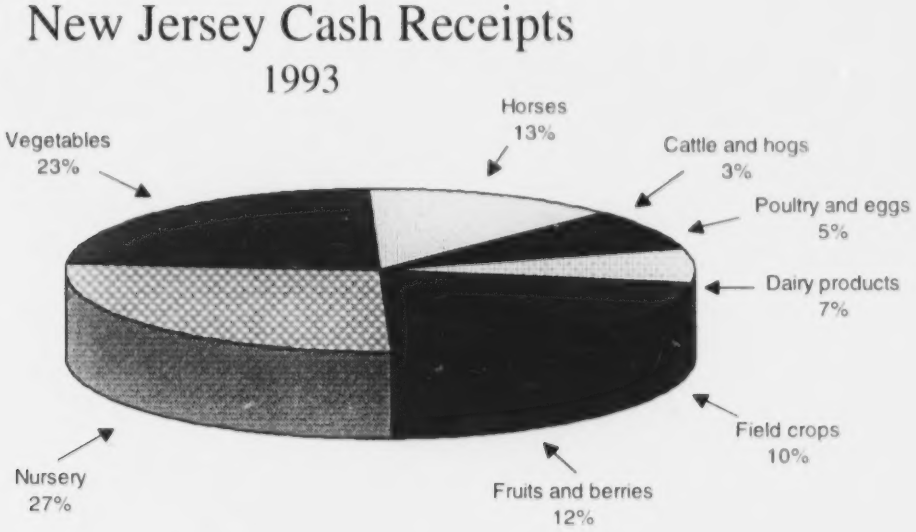
Top 5 Agricultural Commodities, 1994		
Commodity	**% of State's Total Receipts**	**% of US Total Value**
1. Greenhouse and Nursery	33.0%	2.5%
2. Dairy Products	6.0%	0.2%
3. Peppers, Green	5.8%	9.6%
4. Tomatoes, Desert or Fresh	3.7%	2.9%
5. Chicken Eggs	3.4%	0.7%
All Commodities		**0.4%**

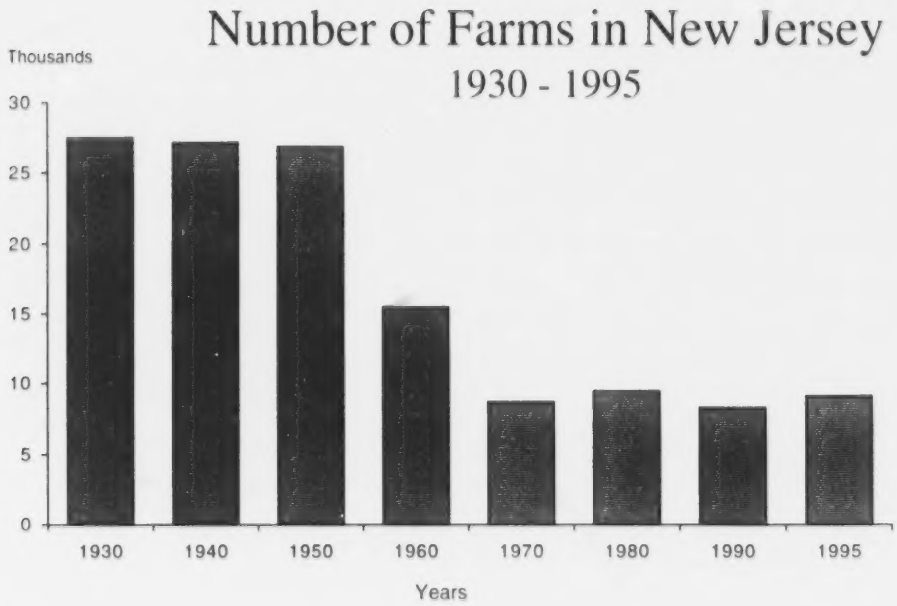
Top 5 Agriculture Exports, Estimates 1994		
Commodity	**Rank Among States**	**Value Million $**
1. Vegetables and Preps.	20	13.8
2. Soybeans and Prods.	27	12.9
3. Fruit and Preps.	17	7.8
4. Dairy Products	28	3.5
5. Seeds	24	2.7
Overall	**37**	**122.9**

Top 5 Counties in Agricultural Sales in New Jersey 1992		
County	**% Total Receipts**	**Million $**
1. Cumberland	13.70%	72.99
2. Burlington	12.11%	64.56
3. Gloucster	10.24%	54.58
4. Salem	10.21%	54.44
5. Monmouth	9.56%	50.95
State Total		**532.99**

Source: Excerpts from Economic Research Service, USDA, Washington, DC nj.txt@www.econ.ag.gov

Data Sheet 12





Lesson 9

Why are farmlands on the edge in New Jersey?

Materials

Farmlands on the Edge (NJN video)
notebook paper
pen or pencil

Objective

After viewing the video, you will be able to identify economic and population changes that have affected agricultural activity in New Jersey.

Procedure

1. Read the questions before viewing the video.
2. Take notes during the video. Write down questions that you may have as you watch the video.

Questions

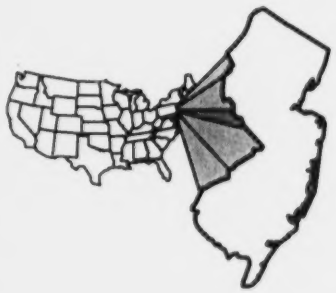
1. In 1956, over one-fourth of New Jersey's land was devoted to farming. What are the factors that have contributed to the decline in farmland in New Jersey?
2. The video was produced in 1989. What were the critical economic factors cited as reasons to leave New Jersey to farm somewhere else?
3. What action is being taken to keep agriculture in New Jersey?
4. What are some reasons for keeping agriculture in New Jersey?
5. What groups might not support a farmland preservation program? What groups might support farmland preservation? Give at least one reason for each group's position.
6. Sum up the main threat to agriculture in New Jersey in a few words.
7. What is meant by sustainable agriculture?

Vocabulary

best management practices
sustainable agriculture
integrated pest management

Lesson 10

Can agriculture be sustained in New Jersey?



Materials

atlases
dictionaries
thesaurus
encyclopedias
reading
notebook paper
group folders
various reference materials

Objective

You will use various reference materials to answer the questions and define terms that may be used during a hearing on funding for the Farmland Preservation Act.

Procedure

Read the questions. Assign research responsibilities. Determine which resources you will need to complete the "Do the Following" section (atlases, encyclopedias, magazines.) Read *The State of the Farm.*

NOTE: There are resource folders for each group with pamphlets, reports, and research documents. Atlases, dictionaries, and other reference books can be signed out for the class period. All materials must remain in the classroom.

Do the Following

1. Find at least 7 examples of agricultural best management practices associated with sustainable agriculture. Create a chart using the following headings.

   Best Management Practice **Description** **Source of Information**

2. Write an original paragraph that defines and describes sustainable agriculture. Be sure to cite sources of information. Use the dictionary to look up unfamiliar words and a thesaurus to find synonyms to avoid repetition.
3. Research the history of agriculture in the United States and New Jersey. Use atlases, resource materials, and articles to develop a time line of agricultural practices. Describe the migration of agriculture from the east coast.
4. Find at least 3 challenges faced by farmers in New Jersey today. Predict whether these will improve, stay the same, or become worse.
5. Find at least 3 environmental concerns associated with farming in New Jersey today. Predict whether these will improve, stay the same, or become worse.
6. Find at least 3 economic concerns associated with farming in New Jersey today. Predict whether these will improve, stay the same, or become worse.
7. Give 3 reasons New Jersey needs agriculture. Give a counter argument to each of your reasons.

Reading

The State of the Farm

Where does New Jersey rank?

The terms truck farming, "Jersey Fresh," and even the slogan "Garden State" would seem to indicate that New Jersey is a national leader in agriculture. However, a quick trip to the United States Department of Agriculture website reveals a very different image of New Jersey. The leaders in agricultural production are California, Texas, Iowa, Nebraska, Illinois, Kansas, Minnesota, North Carolina, Florida, and Wisconsin. On a Northeast regional basis, New Jersey is number three behind New York and Pennsylvania.

In terms of exports, New Jersey tends to rank anywhere from 13 for fruits to 28 for soybeans among states for value of agricultural goods. The number one export trading partner is Canada. The New Jersey Department of Agriculture is actively pursuing export relationships with European Common Market countries.

The acclaimed Jersey tomato accounted for only 3.1% of national tomato sales and 3.4% of New Jersey's state receipts in 1995. Blueberries, which were first cultivated in New Jersey, fare somewhat better with 21.9% of total U.S. receipts generated by New Jersey grown blueberries. Greenhouse and nursery stock generate 33.2% of New Jersey's total agricultural crop receipts, yet contribute only 2.4% nationally. In 1995 New Jersey's top five agricultural commodities, excluding horses, were greenhouse and nursery, dairy products, chicken eggs, tomatoes, and blueberries.

Although the cranberry was first domesticated and commercially grown in New Jersey, cranberries barely make the top ten agricultural commodities. New Jersey is one of five states that has the climate, acidic sandy soil, and wetlands needed to cultivate cranberries on a commercial scale. Cranberry farming in New Jersey has met with stiff opposition from environmentalists who feel that the cranberry monoculture disturbs the biodiversity of sensitive wetlands. Although cranberries were specifically exempted from state clean water legislation, federal wetlands management regulations have tended to slow the development of new cranberry acreage. The unique status of cranberries in clean water legislation is under review.

Although agriculture generates $15 billion each year, it is not even the largest industry in New Jersey. According to information on the New Jersey Department of Agriculture homepage, agriculture in New Jersey ranks third behind pharmaceuticals and tourism in economic benefits to the state.

How did New Jersey become the Garden State?

Abraham Browning is given credit for first suggesting that New Jersey be called the "Garden State" during a speech delivered on August 24, 1876. In 1954, the

General Assembly passed a bill to add the slogan to New Jersey license plates. It was vetoed by Governor Robert B. Meyner, who objected to any slogan appearing on license plates. The bill was sent back to the General Assembly which passed it overriding the Governor's veto. Since it first appeared on license plates, the New Jersey Department of Agriculture has successfully blocked any attempt to change the state's slogan.

What is a farm?

The definition of a farm has changed since 1950 when a farm was defined as "a place of 3 or more acres that produced farm products whose value amounted to $150 or more, exclusive of home gardens. Places of less than 3 acres which had sales of $250 or more were also considered farms" (source: New Jersey Agriculture, 1995). From 1954 to 1974, farms were considered as places with 10 acres or more of land producing $50 or more of agricultural products, or a place of less than 10 acres producing annual sales of $250 or more. Since 1975, the sales figure has been $1,000 per year of agricultural products.

What are the trends in farming?

The majority of farms in New Jersey are small, family-run operations. The average farm in 1995 was 94 acres. That's compared to a national average of 469 acres per farm. The average farm size has varied from 66 acres in 1950 to 124 acres in 1970. Total acres of land-in-farms in New Jersey has declined from 1,770,000 acres in 1950 to 850,000 acres in 1995. On a national basis, during that time period, land-in-farms dropped from 1,202,019,000 to 972,253,000 acres. The number of farms in New Jersey has decreased from 26,900 in 1950 to 9,000 in 1995. Nationally, the number of farms has also decreased from 5,647,800 to 2,073,320. Although the number of farms and acres of land-in-farms have decreased, both in New Jersey and the United States, productivity per acre has increased.

According to New Jersey's Secretary of Agriculture, Art Brown, New Jersey farmers have responded to consumer needs. They grow what the customer wants. "Diversity has made New Jersey strong in agriculture." New Jersey's key farm commodities are: vegetables, fruits and berries, meat animals, milk and dairy items, nursery, greenhouse and forest products, horses, eggs and poultry, and grain and hay.

What's a typical New Jersey Farm like?

Hallock's U-Pick

Ocean County is a leader in the production of cranberries, clams, and field crops. Just a few miles from Six Flags Great Adventure theme park lies some of the best farmland in New Jersey. Hallock's U-Pick, located near New Egypt, is a third generation farm. A sign at the entrance announces that 139 acres of land have been preserved under the Farmland Preservation Act grant program.

Hallock's began in 1949 with 90 acres of land. The family also had a farm in Jamesburg. The stresses of managing two geographically distant farms led the family to sell the Jamesburg land and focus on the New Egypt farm. In addition to the 90 acres owned by the family, the farm included another 90 acres rented on a year-to-year basis from a farmer across the road. The Hallocks grew hay, wheat, and potatoes on land that had been a farm since at least 1850. As time went by, other crops were added including strawberries.

The U-Pick business started accidentally when someone stopped to ask if they could pick and buy strawberries from the field. Word spread and more cars showed up to pick the strawberry crop from the field. The following year more strawberry plants were added and a thriving strawberry operation began. As time went by tomatoes and peas were planted, increasing the U-Pick operation to 50 acres. Sensitive to supplying customer needs, brothers Charlie, Bobby, and Doug Hallock experimented with Southern crops such as okra, black-eyed peas, and butter beans. There were some trial and error results as they learned the temperature, water, and fertilizer needs of these new plants. Sweet potatoes and white potatoes were added to the fields. In 1996, Hallock's U-Pick offered 37 different crops to consumers. The only crops that are not part of the U-Pick operation are watermelons, sweet corn, and cantaloupes. These are harvested and sold at the farm produce store.

According to Doug Hallock, the best corn comes from Ocean County. He cited the soil as the major factor in the flavor of the vegetables grown in Ocean County. The sandy acidic soil has just the right texture for roots to spread, and it drains well so that root rot is not a problem. The one drawback to the soil is that it must be irrigated. The farm uses several water cannons that spray a 250-foot diameter circle with 420 gallons of water per minute. The cannons can water 1200 square feet with 3/4 inch of water in 4 1/2 hours. About 52 million gallons of water are pumped annually. The cannons cool the plants and soil as well as provide water to the roots.

A solid pipe set, much like a yard sprinkler system is also used. In early spring, this is vital to saving the strawberry crop from late frosts. A continuous flow of water keeps plants from freezing and warms up the sandy soil that loses heat quickly once the sun goes down. During the summer, the sprinkler system keeps the plants cool.

All that water could add to the cost of farming, but the water for irrigation comes from ponds and wells on the farm. The farm sits on one of New Jersey's best aquifers (underground water). This requires the farmers to be aware of the impact of farming practices on the environment. Pesticides are expensive. Spraying bills can run around $13,000 per month even with conservative use. By using integrated pest management, the farmer can use less pesticide which saves money and reduces environmental stress. A private company sends a scout to visit the farm and to count the population of insect pests. If a population exceeds the normal ecosystem number, the farmer sprays the field. This means

that instead of automatically spraying every three days, a farmer may be able to spray at five day intervals during peak months.

Soil conservation is also extremely important since the sandy soil tends to move easily in water. The Hallocks have created a system of terraces with raised berms that slow down water and soil. The grassy covering on these long mounds traps soil. At the end of the terraces are grass ponds, large fields of grass that further trap soil. Cover crops are also planted in winter to hold the loose soil in place for spring. The cover crop returns nutrients to the soil. This helps reduce the amount of fertilizer that must be used. The sandy soil lets fertilizer leach into the underground water. Using less fertilizer saves money and reduces the amount of artificial nitrogen entering the ecosystem. Terracing and cover crops are examples of agricultural best management practices.

Land speculators saw New Jersey's population growing and moving into the more rural areas. They began buying relatively cheap farmland in the hopes of selling it later to developers at a profit. The 90 acres of land rented by the Hallocks was purchased by a speculator. They continue to rent it on a year-to-year basis. Development interest in the New Egypt area has declined in recent years, so the land has not been developed and is still available for farming.

The Hallocks expanded their farm ownership from the original 90 acres to 139 acres in 1980. They farm about 300 acres of land and hire about 30 workers. A greenhouse and nursery business accounts for about one-third of their farm income. They stopped going to the farmers' market as their U-Pick business increased. It didn't make sense to pay someone to haul produce to a retail market where it sold at wholesale prices when people were willing to come to the farm and pay retail prices. On a good day 300 cars pass through the checkstand. Unusual products have been added such as corn stalks in the fall. The corn stalks were just waste material after the corn harvest, but customers expressed an interest in buying them for fall decorations. Pumpkins and field corn also became seasonal products at the produce store.

Good management skills and marketing skills are needed to stay competitive. Management strategies include crop rotation, planting by row count to avoid planting too much, advertising in newspapers and distributing flyers, and conservative use of pesticides and herbicides. The Hallocks have consistently responded to consumer requests, including bringing in out-of-state products when New Jersey produce is out-of-season. Sometimes serendipity leads to income. When the farm brought in mounds of large granite rock for a landscaping project, people would pass by the scrap rock pile and ask if they could buy rocks for their gardens. Doug Hallock stuck a sign on the rock pile "50 cents a rock" and found a way to get rid of the leftovers while making money. The Hallock's U-Pick received the Agricultural Society's New Jersey Fresh marketing award.

Farm life is demanding. Seeds for the greenhouse operation must be started in January. Equipment needs to repaired during the off-season to be ready for the

next planting. The farm day begins before sunrise and ends after sunset. Pesticide spraying for example must be done between 5 AM and 7AM. With farm equipment repair charges running around $50 per hour, the Hallock brothers learned to care for their own machinery. There are constant worries such as late and early frosts, droughts, too much rain, pests carried up from the south by hurricanes and severe weather, pesticide and herbicide management, and produce theft. Crops must be planted and harvested at exactly the right time. Vacation time finally comes in December when the produce stand closes down.

Emery's Blueberries

Emery's Blueberries was established during the 1940s by a North Carolina farmer who decided to grow blueberries in New Egypt, New Jersey. In 1985, the farm was purchased by Dan and Diane Passoff who had been tomato farmers in the Englishtown area. Today Diane Passoff manages 30 acres of six different varieties of blueberries. She has kept the Emery name since it had a well-respected reputation and name recognition.

Ocean County is not usually associated with blueberry farming. That claim is made by Burlington County and Hammonton which calls itself the Blueberry Capital of the World. But the sandy, well-drained, acidic soil of Emery's is perfect for small-scale blueberry farming.

Emery's operates a farm stand from Memorial Day through Labor Day. Blueberries come into flower in the spring. The plants are self-pollinating. Because most of New Jersey's native honey bee population has been killed by a mite infection, commercial beehives must be rented to pollinate the flowers. Renting hives is a common practice all over New Jersey. The thirty acres of blueberries require about 50 hives. Emery's buys back the honey and sells "Blueberry Honey" at their farm stand.

Blueberries are relatively low maintenance. They require annual pruning from February to March before the growing season to encourage branching that produces more berries the next year. Pesticides are applied by aerial spraying when needed. Herbicides are used to keep weeds that might compete for soil nutrients under control. Watering is done by irrigation. Blueberries can yield an income of $10,000 an acre with 50% of that as profit.

High bush blueberries are the most common type of blueberries grown in New Jersey. There are many varieties of blueberries that ripen at various times from early July through August. July Fourth has become a traditional time to celebrate the start of the New Jersey blueberry season.

Emery's employs local and migrant field workers to harvest the blueberries by hand. Larger operations in Burlington County use mechanical pickers. The blueberries are picked, cleaned, sorted, and packed for sale at the farm stand. Loose sorted berries are sold to Shop Rite through the Jersey Fresh program. There is also a pick-your-own operation at Emery's on the weekends. How do

you tell if a blueberry is ripe? It sinks in water. Blueberries are brought in from the field and washed in large tubs. Ripe berries sink, unripe berries float.

Expansion of the blueberry acreage at Emery's ran into a problem with wetland regulations. Land that had been cleared but allowed to undergo succession was designated as wetlands that could not be developed for any purpose. Emery's currently has 10 of its 40 acres in wetlands. Nut sedge, a plant that has done well along the irrigation channels has become a problem in the blueberry rows. It resists herbicides, dulls the tiller blades, and just can't be pulled up fast enough.

Ringed by trees, the blueberry acres provide easy food for birds who use the woods as nesting grounds. This might seem like a problem, but the bushes are productive enough that they yield enough for the farmer and the birds. Smaller operations resort to using netting to protect the berries. Large operations in Burlington County may actually be contributing to an increase in New Jersey's bluebird population. The bluebirds thrive in the habitat provided by the blueberry farms. (No, the blueberries do not make the birds blue!)

Terhune Orchards

When Gary and Pam Mount returned from working in Africa with the Peace Corps, they decided that they wanted to be farmers. It was a decision that met with some skepticism from their family members who felt that there was no future in farming. The first obstacle that faced Gary and Pam was finding the money to buy enough land to make a farm economically viable.

Historically, farms are not good financial risks for banks. A farmer's expenses are mostly up front with money tied up in land, seeds, pesticides, fertilizers, equipment, and employee wages. The revenue isn't generated until the crops are harvested and sold. A single night of freezing weather at a critical moment can wipe out a year's investment and leave the farmer with a mountain of debt and no income from the ruined crops. Farmers in New Jersey today, often find themselves with land worth more than what they can produce on the land. This is one reason Gary and Pam's families were not ready to see them make such a risky move when accounting or some other business pursuit seemed so much more secure.

The Mounts found land in the Princeton area on Cold Soil Road. The climate, location, and soil were perfect for an orchard, and it included a mature stand of apple trees. To finance the land purchase, the Mounts applied for benefits under the Farmland Preservation Act. They sold the development rights to 500 acres of their farm to the state. This meant that they retained ownership of the land, but that the land could never be sold for any purpose other than agriculture.

A visit to Terhune Orchards is an introduction to many agricultural best management practices (BMPs). Although the BMPs are environmentally beneficial, they wouldn't be used unless they also provided economic benefits to farmers. Although the farm came with an old established orchard, the romantic rows of trees are not as productive as newer intensive cropping methods using dwarf

apple trees. The Mounts added rows of dwarf apple trees that stand side-by-side in straight rows. They produce more apples per acre than the traditional spreading-tree orchard.

To control insect pests, the Mounts use integrated pest management. By spraying a specific pesticide only when it is needed, they save money and reduce stress on the ecosystem. To reduce accidental contamination of the soil and ground water, the Mounts built a special shed for pesticide storage and preparation. The pesticides are loaded and handled on a concrete slab that protects the soil from accidental spills.

The orchards are irrigated using a water conserving method developed in Israel. A water pipe runs along the orchard rows with a small pop-up spigot at the base of each tree. When the water is turned on, each tree is individually watered at its base. Less water is lost into the atmosphere and more water is delivered to the plants.

Field crops, raspberries, and blueberries are watered using drip irrigation. Long rows of plants are grown through a black plastic covering. Water lines run under the plastic. The plastic keeps weeds out of the rows and prevents water from evaporating. The plastic ground cover replaces the use of chemical herbicides which could contaminate ground water.

The Mounts try to control wildlife invasion of their farm with fences and netting. Fences are need to keep deer out of the apple orchards and netting is needed to keep birds from eating the berries. Farmers must expect a few loses to wildlife.

Terhune Orchards allows people to come in and pick their own apples and berries. They also run an extensive school farm tour operation. To add interest to the farm tour they have developed a small petting farm with Guinea hens, sheep, goats and other animals. The Mounts have received awards and recognition for their agricultural education efforts and marketing skills. They feel that the open space provided by their farm is essential to the quality of life in an area undergoing rapid development. Pam Mount stated that farms provide open space, habitat, aquifer recharge, and jobs.

What's the bird's eye view of New Jersey?

Airplanes shuttle back and forth between Washington, D.C., and Newark, New Jersey, almost hourly. The low flight on a cloudless day offers a breath-taking bird's eye view of New Jersey. As the plane crosses Delaware Bay, the first thing one sees is the Salem nuclear power plant. This large concrete and metal structure dominates the flat green landscape that can be seen from the airplane window. As the plane cuts across Cape May, the dark lines cut by the rivers emptying into the Delaware Bay become visible. The water flowing from the Delaware River and the smaller outer coastal plain rivers mixes with the salt water of the Atlantic in a swirl of gold, green and blue.

As the plane continues over Salem county, a patchwork of fields and orchards spreads out from horizon to horizon. In early spring, the quilt is a mix of browns

and greens, bare fields and budding trees. Later in the year, shades of green, fields of green stripes on brown, and colorful flowers create the illusion of a giant bedspread thrown over the southern part of the state.

Around Princeton, a huge sprawling gray development of condominiums jarringly breaks up the green and brown of field and forest. Moving northward, the colorful landscape becomes criss-crossed with roadways. Parking lots, ball fields, and houses stand at the edges of brown and green fields. Suddenly, open space dwindles and every square inch of land seems to have something built on it. Car traffic becomes a steady stream. At night the headlights blur into a white tube-like snake along the Garden State Parkway and New Jersey Turnpike. Tall buildings, sidewalks, black-topped roads crowd together ending at the edge of marshes and landfills. There the plane lands at New Jersey's largest city, the Gateway to New Jersey.

What will New Jersey look like in 2010? Will it still be the Garden State? Will farms yield to development? Where will the growing population go? You decide.

Information Sources

New Jersey Agriculture 1995, NJ Department of Agriculture and U.S. Department of Agriculture's National Agricultural Statistics Service

New Jersey Department of Agriculture website (http://www.state.nj.us/agriculture)

United States Department of Agriculture website (http://www.usda.gov)

Interviews with New Jersey Secretary of Agriculture Arthur Brown, Doug Hallock, and Pam Mount

Farm visits to Hallock's U-Pick, Terhune Orchards, and Emery's Blueberries

Lesson 11

Should state government help preserve farmland?

Materials

reading
large sheets of paper
notebook paper
markers
colored pencils
reference materials
group folders

Objective

You will demonstrate your understanding of research methods and data presentation by preparing a debate presentation on the resolution "Resolved, New Jersey should continue to pursue a public policy of farmland preservation."

Procedure

1. Your group will be assigned a role to play in a debate on the resolution. Read *Farmland Preservation Program*. Determine your major concerns and priorities.
2. Each group will prepare a presentation with a minimum time limit of 10 minutes and a maximum limit of 15 minutes.
3. Each member of the group must speak at least 2 minutes during the presentation.
4. The use of graphs, charts, and maps is encouraged and will be awarded points.
5. Factual information must be presented to support opinion statements. The source of the information must be cited. You may use speech cards during your presentation for quotations from sources.
6. Your presentation will be evaluated for clarity, eye contact, preparation, use of source information, organization, and use of supporting graphs, charts, and maps. Your grade will be based on individual effort and the overall group presentation.

Viewpoints

Farmers
Real Estate Developers
Conservation Groups
Home Owners from Hudson, Bergen, Essex, and Union Counties
Southern and Central New Jersey Home Owners
Corporate Planning Committee
Town Planning Board Members
Commerce and Economic Planning Committee

Reading

Farmland Preservation Program

The Farmland Preservation Program is defined by the Agriculture Retention and Development Act (N.J.S.A. 4:1C-11 et seq.) as a voluntary program "...which has as its principal purpose the long-term preservation of significant masses of reasonably contiguous agricultural land within agricultural development areas.... and the maintenance and support of increased agricultural production as the first priority of the land." The State Agricultural Development Committee oversees programs that include the purchase of development easements, deed restrictions, and financial assistance. Farmers can sell to the State the development rights to their farmland. Applications are reviewed by county committees and evaluated. If the farm meets the State requirements and money is available, then the acreage enters the Farmland Preservation Program. The New Jersey Department of Agriculture's long-term goal is to buy development rights to at least 500,000 acres of farmland. As of spring of 1997, 35,000 acres have been preserved at a cost of $167 million. The Farmland Preservation Program depends on public funding and funds are always in tight supply.

The Role of State Planners

The State Planning Act was adopted in 1985. In part it states the need for New Jersey to engage in sound, integrated Statewide planning to "...conserve its natural resources, revitalize its urban centers, protect the quality of its environment, and provide needed housing and adequate public services at a reasonable cost while promoting beneficial economic growth, development, and renewal..." (N.J.S.A. 52:18A-196 et seq.).

The State Development and Redevelopment Plan published in 1992 provided a broad outline for statewide development that would control the spread of urbanization, shift population back to cities, conserve natural resources, and generally move New Jersey toward sustainability. However, the plan is only a guideline. It is not binding on state, regional, municipal, or local planners.

With regard to agriculture, the plan states: "The essential elements of Statewide Policies for Agriculture are to promote and preserve the agricultural industry and to retain farmland in the 'Garden State' by coordinating planning to protect agricultural viability while accommodating beneficial development and economic growth necessary to enhance agricultural vitality and by educating residents on the less obvious benefits and special needs of agriculture."

The main reasons given for preserving agriculture in New Jersey are: (1) rural lifestyles add to the cultural diversity of New Jersey, (2) well-managed agriculture contributes to the protection of environmental resources, (3) agricultural lands maintain contiguous open space and woodlands thus

preserving the quality of aquifer recharge areas, soil resources, and wildlife habitats, and (4) agriculture contributes to the economic diversity of New Jersey.

Conservationists

Most conservation groups in New Jersey agree that there is a need to plan development so that open space, wildlife habitat, and natural resources are not strained. During the summer of 1997, a petition movement was initiated to get the state government moving on giving the State Plan for Development and Redevelopment some real power to become reality. William R. Neal, assistant director of Conservation for New Jersey Audubon Society stated, "In 50 years, people in Warren and Hunterdon counties are going to wake up and say, 'We look like Bergen County.' Bergen County is nice, but ... the whole state shouldn't look like that." (The Sunday Record, April 20, 1997) Conservation efforts have largely focused on preserving natural habitat regions such as the Pine Barrens and the Highlands.

Wetland protection has become an emerging environmental issue among New Jersey conservationists. Wetlands were once viewed as worthless wasteland suitable for landfill activity and development. Growing awareness of the importance of wetlands as water recharge areas, as habitats for wildlife, and as natural flood control has lead to stepped up efforts to educate students and the public about the need to preserve existing wetlands. This has set up some conflict over expansion of cranberry bogs into natural wetlands owned by farmers. Conservationists are concerned that the establishment of a single plant type (monoculture) in a bog will in the long-run degrade the value of the wetland as habitat.

Conservationists agree with those who seek to preserve farmlands that New Jersey needs to maintain contiguous open space and woodlands. However, some argue that farmland is not as high quality open space as natural habitat with biodiversity in both plant and animal species. Tree-lined windbreaks used to prevent wind erosion of soil create edges that favor species such as the brownheaded cowbird and deer. Some conservationists would like to see preservation efforts focused on saving large tracts of woodland that offer the interior habitats needed by warblers, rose-breasted grosbeaks and other migratory neotropical song birds. A Green Acres bond program totaling $1.5 billion has purchased 220,000 acres of land for parks, forest preserves, recreation areas, and historic sites. Although such land totaled 800,000 acres in 1996, it is still short of the goal of 1 million acres of open public space by the year 2010. The cost of meeting that goal is estimated to be about $3.2 billion.

Moderate conservationists concede that open space used for best management practices agriculture is better than pavement, buildings, and bright green fertilized yards. Practices such as integrated pest management, soil conservation, water conservation, and fertilizer reduction have taken some of the

edge off environmental criticism of small-scale agriculture in New Jersey. In light of the threat to the aquifer that development poses, farmland preservation may become an issue that more conservationists will embrace as the population grows.

The Migration from North to South, East to West

The State Plan for Development and Redevelopment calls for managed dispersal of the anticipated population increase. Emphasis is on planned developments that provide a balance of commercial, residential, agricultural, recreational, and open spaces. The vision is a revitalization of the major designated urban centers —Atlantic City, Camden, Elizabeth, Jersey City, New Brunswick, Newark, Paterson, and Trenton—so that transportation, housing, and employment create thriving attractive cities that make use of existing resources and improved infrastructure (roads, railways, sewer lines, etc.). Two regional planning centers have been identified and include 14 municipalities in the Hackensack Meadowlands Development Commission and the Pinelands Commission. For the most part, The State Plan calls for growth to be limited to areas that are already developed.

However, since land is privately owned and The State Plan is not legally binding, development does not necessarily follow the plan. The trend has been for migration of population out of densely populated counties into traditional agricultural areas and into the forests of the Highlands. Development has been a patchwork that has in some cases strained water, transportation, and waste disposal resources.

Bergen County is one of New Jersey's most densely populated counties and one that is experiencing population migration west and south. It's hard to tell where one town ends and another begins. Fair Lawn, Elmwood Park, Paramus, and Glen Rock blend into each other. A Midwestern visitor who was accustomed to a pattern of a town center surrounded by suburban developments with a rural edge had a difficult time understanding that during a trip to the George Washington Bridge along Route 4, she had passed through several independent boroughs. She thought she had been in one big city like Cincinnati or Cleveland. That describes the density in most of the heavily populated counties.

Population centers offer a wide variety of services to residents. A commute by train from Fair Lawn (Bergen County) to the World Trade Center in New York City takes about 1 hour on a good day (a good day being no delays on New Jersey Transit or the PATH train). Fair Lawn is identified in the State Plan as an existing regional center which is defined as an area along transportation with mixed use development, a population density in excess of 1,000 persons per square mile, and an emphasis on employment. Regional centers are compact so as to permit pedestrian mobility and easy access to public transportation, which means shopping areas, houses of worship, and transportation to employment are

for the most part within walking distance from any neighborhood. The town supports an active youth recreation league including organized soccer, baseball, softball, basketball, football, and roller hockey. Two municipal pools serve residents with a nominal charge for membership. The high school was recognized as a Blue Ribbon School of Excellence. Students attending the two middle schools and the five neighborhood elementary schools have earned national, state, and regional academic awards. Fair Lawn also includes Radburn, the first planned community in the United States. Interstate 80, state highways 4, 208, and 17, and the Garden State Parkway are only minutes away from the main through roads. Community efforts have lead to improvements in neighborhood parks and recreation areas. Additional development is planned on the outskirts of Fair Lawn to add senior citizen and/or low-income housing to the mix. Yet, houses go up for sale and people move to central New Jersey.

"It's one of New Jersey's best kept secrets," said one commuter and former Fair Lawn resident. "I can leave home and be in my office in downtown New York in about one hour." The commute took the same amount of time as the one he had made for years from Fair Lawn, but now he was commuting by rail from Princeton to Newark to the World Trade Center. When asked why he had moved from Bergen County to a new development outside Princeton, he stated that for the money he received selling his small Fair Lawn cape, he had been able to buy twice the house on 2-acre zoning. The schools were newly built and equal in quality to those in Bergen County. But, the overwhelming reason was a feeling of being less cramped.

"What do you mean the population is moving to central New Jersey?" was the reaction of a resident of a small town in Ocean County. "The roads are already too busy. Where are they going to drive, for Pete's sake! Down the shoulder? Have you seen what it's like here on a Saturday or rush hour or when it floods on Route 18?" She really didn't want to hear any more about the anticipated increase in population, but her reaction points out the pressure that uncontrolled development will place on already strained infrastructure in central and southern New Jersey. There are few roads capable of carrying all of the commuter traffic that follows development. Congested roads are already a problem along Routes 1 and 18 in central New Jersey. The highlands are difficult terrain for new roads considering that it's easier to go around the mountain than it is to go over the mountain. New Jersey highways were designed to move people along the New York City/Philadelphia corridor and to the New Jersey shore.

Municipal Planners and Economic Development

In recent years New Jersey was declared open for business, and business tended to move into central and southern New Jersey rather than into urban areas. In some cases, it was less costly to build a new building than to upgrade an old building leading some companies to abandon older factories and industrial parks in northern New Jersey for cheaper real estate in south and central New Jersey.

Southern and central New Jersey municipalities offered tax incentives to lure businesses with jobs into areas with high unemployment rates. The potential for broadening the tax base appealed to municipal planners anxious to supply relief to home owners who bear the burden of supporting schools and social services through property taxes. Farmland was the biggest casualty in the industrialization of central New Jersey. Some farmers reasoned that it just made sense to sell the land in New Jersey and move to Pennsylvania where the return on the farm dollar was greater. Others were ready to retire from farming and had no one in the family to whom they could pass the land.
The challenge to municipal planners looking toward 2010 is to balance economic growth, development, and open space. The lesson to be learned from New Jersey's past is that it's easier to preserve open space than to try to get it back once it's been developed.

Farmers

For those farmers who have remained in New Jersey, new strategies have been required to stay in business. Stricter pollution laws have led to changes in how farming is done. In many instances, these changes have reduced the cost of farming without a loss in productivity. Overall, the farm of the late 1990s is more productive per acre than the same farm fifty years ago. Farmers have actually been able to produce more on less land. Farmers are exploring regionalization strategies to improve economic efficiency. This includes regional packing plants and distribution centers. Diversification into new products has been a successful strategy for some farmers. Aggressive marketing campaigns both domestic and foreign have created a demand for specialty products from New Jersey. Farm land has been lost to development and reclaimed as forest as well. The future of agriculture in New Jersey will largely depend on actions taken during the 1990s. Decisions made now will determine the face of New Jersey in the twenty-first century.

Farming Trends Across the State

Since 1954, the northeastern most counties of New Jersey have experienced a decline in the number of farms. Bergen County farms dropped from 547 in 1954 to 127 in 1992. In that same period, Morris County farms went from 1,023 to 395 and Passaic County farms from 314 to 55.

The land use trend was from agricultural to residential. Movement of residential neighborhoods into rural agricultural areas sets up a conflict between homeowners and farmers over noise and odors that can arise as the result of farming activities. George Horzepa, director of the state Department of Agriculture's Division of Rural Resources, explained that conflicts arise "when new people move into an area that aren't familiar with farming--- urban people moving into a rural area because they like the open space that a farm affords and then all of a sudden realize that farming is a business that requires early morning

activities. And then to some extent reality sets in for them that there's a price to pay for that open space and bucolic quality of life. " (Source: The Record, October 29, 1996, "Right to Farm vs. Right to Quiet Life," Paul Rogers.)

Typical newspaper headlines in The Record, Bergen County's major regional newspaper, were: "Right to Farm vs. Right to Quiet Life," "Farmer Fights to Keep Compost Source," "Family Farm Persists as Industry Closes in," "Farm Aid," "Saving the Family Farm," and "Sun Setting on Family Farm."

When the Demarest family sought to move their farmstand from a small garage on Wiermus Road to a larger store across the street from the old stand, they met considerable initial opposition from neighbors. The Hillsdale Demarest Farm, which was founded in 1886 and farmed by four generations of Demarests, was protected under the New Jersey Right to Farm Act of 1993. After lengthy planning board hearings, the new larger permanent farmstand building was approved and constructed on land bounded by Wiermus Road and the Garden State Parkway. The Demarest family used a farmstand and pick-your-own strategy to keep their orchard, fruit, and vegetable operation in business.

Farms in New Jersey tend to be family affairs that are handed down from generation to generation. The Farmland Preservation Act and more recent inheritance tax laws are making it easier for farmers to stay in business. What happens when there's no one left to carry on the family business? This is the problem faced by Richard Tice of Tice Farms in Woodcliff Lake. At age 65, Richard Tice is ready to retire from farming, but has no one to whom he can pass on the farm. His proposal to develop the property as a mall has generated heated debate over the loss of open space and the increased traffic it would create. The town planning board has considered rezoning the area preventing mall development but permitting uses such as a sports and fitness center, office space, a nursing home, a senior center, and a post office. Tice Farms will close down operations. The question remains what will replace it.

Bergen County continues to lose farms. In 1994, Van Riper Farm, founded in 1791, was sold and developed into a supermarket. The 17-acre Mettowee Farm in Upper Saddle River went up for sale in 1996 at an asking price of $3 million dollars. It remains to be seen whether local residents will be able to purchase the farm for open space preservation or if a developer will buy the land for new housing starts.

While residential and commercial development continues in Bergen County, other counties are pondering what their future will look like. The desire to keep open space in the most densely populated state led U.S. Senator Robert Torricelli (D-NJ) and former state Senator Gordon MacInnes (D-Morris County) to back federal reform of the inheritance tax. MacInnes said, "If we pave over the state, who is going to want to live here and provide jobs here?" While Torricelli stated, "This law will help keep counties like Morris, Warren, and Sussex from

making the same mistakes as Bergen County." (Source: The Record, August 5, 1997, "Saving the Family Farm," John Cichowski.) The changes would reduce the tax burden on the next generation of family farmers and help the family keep the land intact. Charles Suk of Denville cited inheritance taxes as the reason he had to sell 30 acres of his 60 acre farm. The farm had been in the family for over 100 years. The 30 acres he sold is now a housing development on the edge of his remaining 30-acres of farmland.

Southern New Jersey is a stark contrast to northern New Jersey. It's hotter, wetter, sandier, flatter, and has a longer growing season. In short, it is the perfect place to grow peaches and other crops that need the type of soil and ocean-moderated climate that southern New Jersey provides.

One of the largest farms in New Jersey is operated by the DeCou family in Shiloh, Cumberland County. The DeCou family has been in farming for four generations, although the current DeCou Hilltop Orchards began in 1962 when Eugenie (Genie) DeCou and her husband took a detour into farming on their way to the Peace Corps. With land acquisitions every three years or so, the farm has grown from 283 acres to over 500 acres. The DeCou family grows peaches, nectarines, apples, wine and table grapes, pumpkins, raspberries, and blackberries on a commercial scale. The bright pink packing boxes of DeCou fruits travel through the Jersey Fruit Cooperative Association to Florida, Texas, Canada, South America, Europe, and around New Jersey.

Although there's plenty of land and a great growing climate, south Jersey farmers have had to be creative to stay competitive. One challenge has been a decline in interest in farm work. According to Genie DeCou, there has been a "nonpreference" for farm work even though Cumberland County has a high unemployment rate. She and other large farm operators have had to rely on work crews from Mexico for planting, pruning, picking, and packing. The farms of the Jersey Fruit Cooperative Association employ anywhere from 600 to 700 laborers.

When grower profits became stagnant in 1940, 24 farms banded together as the Jersey Fruit Cooperative Association. Together, the farms comprise 5000 acres of land and produce 60% of the peaches, 80% of the nectarines, and 70% of the apples harvested in New Jersey. Traditionally, each orchard sorted and packed their own produce. This required a cooling bath, a sorting belt and a packing line. Peaches coming in from the field can reach temperatures over 100 degrees on a hot day. They need to be flash cooled in a 50-degree water bath to preserve their freshness. Packing is labor intensive and costly. To improve profitability, the Jersey Fruit Cooperative Association built a centralized packing and distribution center scheduled to begin operation in 1997.

Regionalization and the formation of cooperatives such as Jersey Fruit Cooperative Association and Ocean Spray may be one way New Jersey farmers

will stay in business.

What Is the Future for New Jersey?

In the past 10 years, large industries such as Hunt Wesson, Owens Illinois, and Steveco Knit have moved out of Cumberland County. The highway system passes through southern New Jersey, but doesn't really seem to connect east to west except for the Atlantic City Expressway. Residential developments have increased, but not at the rate in more affluent central counties. Property values in Cumberland and Salem counties have been fairly stable and farmland tends to stay on the market longer than in Bergen, Passaic, or Morris counties. Conservation and historical preservation groups have been active in promoting ecotourism in the Delaware Bay and Pine Barrens regions. One small village, Greenwich, has set out to prevent development altogether, preferring to keep it's colonial quality intact.

In the past 10 years, central New Jersey has experienced population growth and become home to many large corporation headquarters. Highways and other infrastructure have been pushed to the limit by the expansion. Without new roadways and development of regional transportation, the bottlenecks and traffic jams along Route 18 and Route 1 are likely to become worse.

Most of New Jersey's forests are in the highland areas of Warren, Sussex, Somerset, and Passaic counties. A valuable natural resource that protects the drinking water supply of over 2 million northern New Jersey residents, the forests may lose out to development if the westward migration out of Bergen, Essex, and Hudson counties continues.

Bergen County continues to lose open space to residential and commercial development. At the crossroads to New York and Connecticut, northern New Jersey has a well developed highway system with easy access to the New Jersey Turnpike, Garden State Parkway, routes 80, 280, 287, 208, and 78. Over 56% of New Jersey's population is concentrated in the Gateway Region of Bergen, Passaic, Hudson, Essex, Union, Monmouth, and Middlesex counties. The trend has been for population to move from urban to suburban areas and for the suburbs to replace rural space.

What New Jersey looks like in fifty years will depend on statewide cooperation taken in the next few years.

Lesson 12

Can we find common ground?

Materials

large sheets of paper	markers
masking tape	colored pencils
notebook paper	reference materials
state maps	group folders

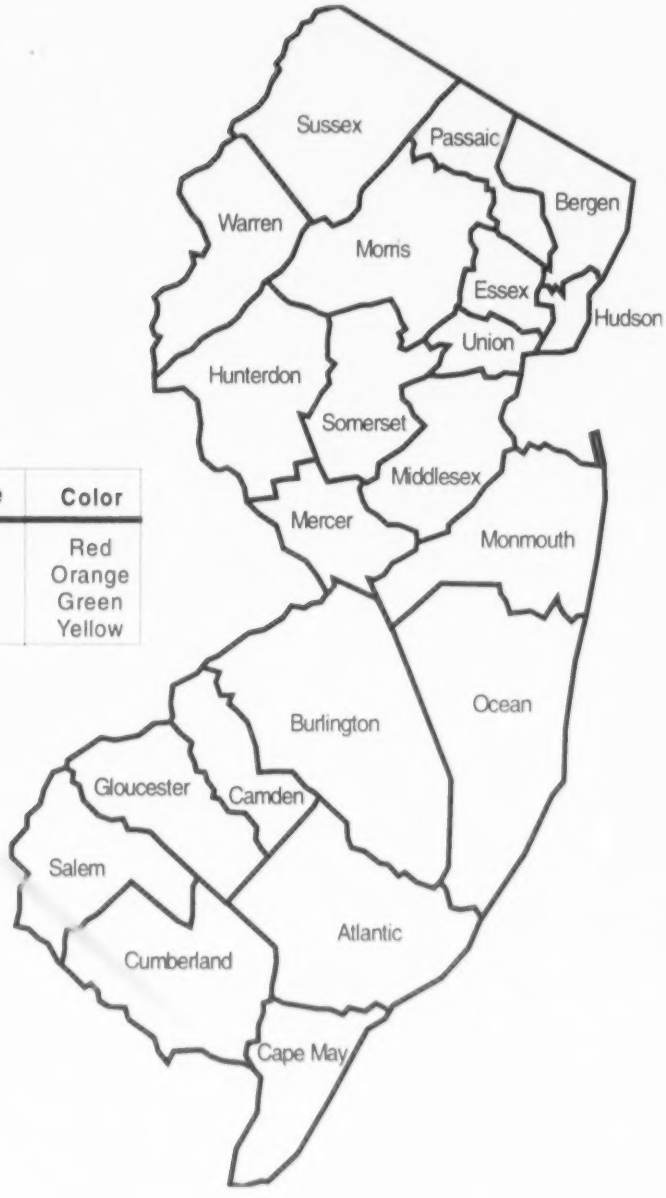
Objective

You will negotiate a consensus position on farmland preservation with persons representing a variety of viewpoints, and you will make two projections of possible consequences of your consensus.

Procedure

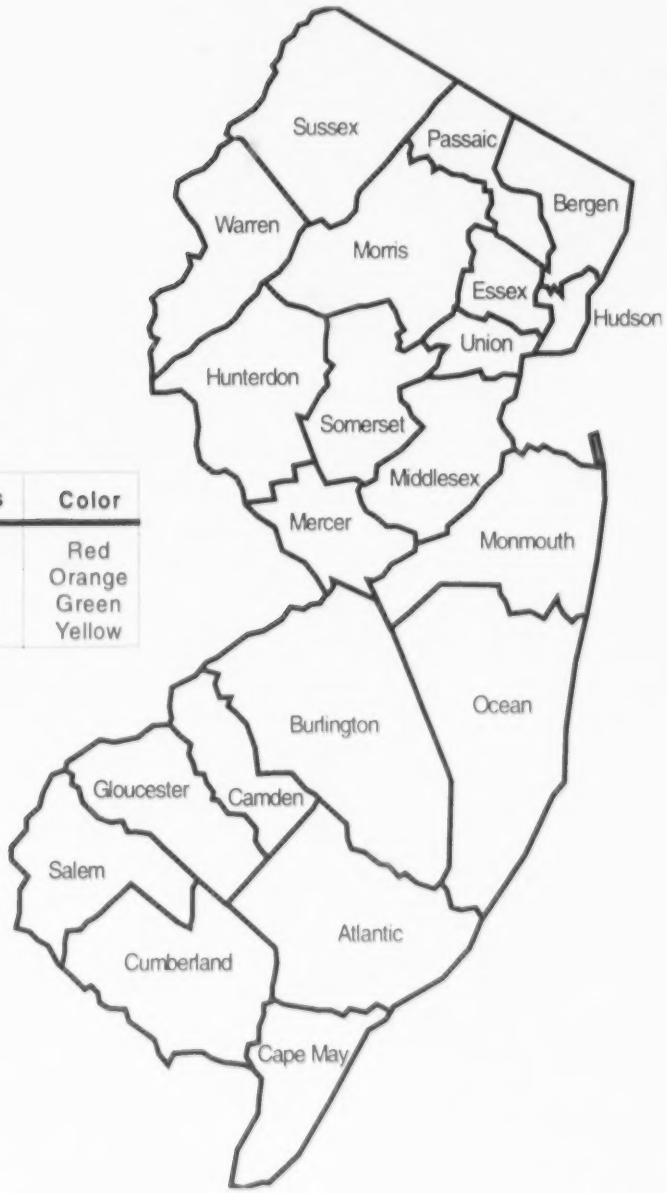
1. You have been put into a new group of students in which each of the viewpoints from Lesson 11 is represented.
2. Consensus is not like a vote where the majority opinion wins and the minority loses. Consensus requires everyone in the group to see an issue from all points of view and then come to agreement on a plan. Consensus may require compromise. In this activity your group will use information from the previous debate to analyze the pros and cons of supporting farmland preservation in New Jersey.
3. Begin by generating a list of reasons why farmland should be preserved, and then generate a second list of reasons why it should not be preserved. One or two persons should record these two lists on newsprint for all members of the group to see.
4. Analyze the reasons given on both sides of the debate from your own personal perspective, not necessarily from the role you played in Lesson 11. Which reasons do you think are valid or invalid and why? As a group, rank order them by renumbering them according to those that carry the most weight for you to those that carry the least.
5. Reach a consensus on what your group thinks should be done about farmland preservation. Each person will write the consensus as a brief statement in his/her own words. Include responses to the most important objections to your viewpoint.
6. After reaching a consensus, color in the state maps so that it shows what you think New Jersey will look like in fifty years if your consensus is implemented. Prepare one map to show population density, as you think it will be distributed in fifty years, and one map to show acres of land in farms in fifty years.
7. Present your consensus and maps to the class. Explain your decisions.

People per square mile	Color
More than 10,000	Red
2,250 - 9,999	Orange
500 - 2,249	Green
0-499	Yellow



30

Acres of Land in Farms	Color
20,000 and above	Red
10,000 - 19,999	Orange
1 - 9,999	Green
0	Yellow



Answers to Lesson Questions

Lesson 1

1. Bergen, Passaic, Hudson, Essex, Camden, and Union
   These counties have areas marked in yellow which on the AAA road map means population is 10,000+. There may be questions about Vineland which actually includes more than just one community.
2. All the other counties.
3. Hudson County is the smallest. Students may have trouble spotting it as a county since it appears to blend into Essex and Bergen counties.
4. Most groups choose Burlington. Accept answers based on student reasons for their guess.
5. Most groups figure out that Hudson county is all city and the smallest land area.
6. Answers vary, groups usually choose Sussex because there are few roads and several forests.
7. Usual answers are Bergen, Essex, Passaic, and Hudson.
8. Students usually give reasons such as patterns of immigration, proximity to New York City and Philadelphia, location relative to major highways, and unsuitability of Pinelands and Highlands for large-scale settlement.
9. Answers vary but usually do not include the five most densely populated counties.
10. Students usually give the reason as "because there are no cities there." Some suggest soil as the reason.
11. The key or legend provided the clues.
12. Students usually say that they need population data and acreage data.

Lesson 2

1. 1990 - Bergen, Camden, Essex, Hudson, Middlesex, Monmouth, Passaic, Union
   2010 - add Burlington, Morris, Ocean
2. 1990 - Cape May, Salem, Warren (< 100,000)
   2010 - Salem only (< 100,000)
3. All but Essex.
4. Sample: The numerical data regarding population recorded as a census can be shown on a chloropleth map. Maps can be used to show location. Chloropleth maps can be used to show the location of population using colors to represent population ranges. Accept all answers that make sense.

Lesson 3

1. Hudson for both 1990 and 2010.
2. Category changes: Middlesex, Burlington, Atlantic, Cape May (all increased density.
3. Geographic questions relate to location, region, movement, place, and human-environment interactions. Student responses will probably begin with "Where..., or Why..." and involve the location of population.
4. Accept all reasonable answers.

Lesson 4

Color	Counties		Percent Population	Percent Land Area
Red	Hudson		7.2%	0.6%
Orange	Bergen Essex Union	Camden Passaic	39.6%	10.8%
Green	Middlesex Gloucester Mercer Monmouth	Morris Ocean Somerset	37.3%	36.9%
Yellow	Atlantic Burlington Cape May Cumberland	Hunterdon Salem Sussex Warren	16.1%	50.8%

Lesson 5

1. The population of New Jersey seems to double every 50 years. Answers will vary, but most students will project a population of about 14,000,000 by 2050. How students arrive at an answer is more important than obtaining an exact number.
2. The line graph shows a trend. The chloropleth map is like a snapshot of one moment in time.
3. A line graph would be used to show the continuous change in population over many years. A chloropleth map would be used to show the location of related groups such as counties that have the same population density. A pie graph would be used to show the percentage of counties that have a population in fixed ranges.

Lesson 6

1. Atlantic, Bergen, Essex, Ocean, Passaic, Warren
2. All others lost acreage.
3. Hudson
4. Counties gaining population are losing farmland.
5. Student responses will vary. Accept reasonable predictions based on analysis of population trends.
6.

County	% Change	County	% Change
Atlantic	0.6%	Middlesex	-0.8%
Bergen	1.5%	Monmouth	-10.8%
Burlington	-5.8%	Morris	-11.7%
Camden	-22.3%	Ocean	17.5%
Cape May	-14.1%	Passaic	33.2%
Cumberland	-5.2%	Salem	3.1%
Essex	5.7%	Somerset	-2.7%
Gloucester	-0.6%	Sussex	-4.0%
Hudson	NA	Union	-27.6%
Hunterdon	-14.0%	Warren	0.1%
Mercer	-13.4%	**Total**	**-5.2%**

7. Students may change their answers or confirm them.

Lesson 7

1. Sandy soils tend to be over sandy bedrock. Loamy soils tend to be in areas where there is decayed vegetation over porous rock. Glacial till is related to rock material carried down from northern NJ.
2. Well drained acidic sandy soil.
3. Plants depend on soil for growth. Knowledge of soil type is important to farmers who must decide what to grow. They can't afford to plant crops if they won't grow in a certain type of soil. A developer needs to know what type of soil in order to design the building structures. Building on bedrock requires a different construction plan than housing built on sand.
4. The sandy soil allows for penetration and purification of water. The deeper underlying bedrock acts a trap for the aquifer.
5. Examples: roads, forests, nature preserves, towns, cities, agriculture. After brainstorming, students can refer to the map of land use in the State Plan.

Lesson 8

1. The following table shows the top ten commodities,
2. and includes the answers to question 2.

Commodity	Dollar Value	Counties in which they are grown	Soil Type
1. Horses	$91,000,000	Monmouth, Middlesex, Salem, Gloucester, Atlantic	N/A
2. Dairy	$46,644,000	Warren, Salem, Sussex, Hunterdon, Burlington	N/A
3. Peppers	$44,975,000	Gloucester, Salem, Cumberland, Atlantic, Monmouth	Sandy
4. Tomatoes	$28,863,000	Gloucester, Salem, Burlington, Cumberland, Monmouth	Sandy
5. Eggs	$26,684,000	*No counties listed in statistics*	N/A
6. Cranberries	$26,432,000	Burlington	Sandy Bog
7. Soybeans	$25,607,000	Salem, Burlington, Cumberland, Gloucester, Middlesex	Sandy
8. Blueberries	$23,205,000	Atlantic, Burlington	Sandy
9. Peaches	$22,685,000	Gloucester, Cumberland, Camden, Atlantic, Burlington	Sandy
10. Lettuce	$15,869,000	Cumberland, Atlantic, Warren, Gloucester	Sandy

N/A—Soil Type is not applicalbe since these commodities do not depend on soil for growth. Open space is the major factor.

3. Student answers will vary, but should be logical.
4. In 1994, New Jersey contributed $122,900,000 to the $43,510,900,000 in United States commodity exports. That's about 0.3%. Overall, that may not seem like much, but New Jersey is the third largest producer of cranberries, the second largest producer of blueberries, the fourth largest producer of peaches, the third largest producer of peppers, and the fifth largest producer of lettuce. The climate and soil needed for these crops is found in few other states. If New Jersey continues to lose farmland, production of these crops will probably decrease.
5. Both are used to compare data. The pictograph is useful for conveying information such as the comparison of the top ten commodities. The bar graph is useful to compare commodity production from year to year.

Lesson 9

1. Farming is too costly in New Jersey; farm suppliers have left New Jersey; farmland is worth more than the commodities that can be supported by the farmland; farmers are overly regulated in their use of pesticides and herbicides; neighbors complain about the noise and smell of farming; better opportunities can be found in Pennsylvania. Students may use the Internet to answer this question.
2. Real estate prices, development, cost of farming, and prices for produce are the reasons most students cite.
3. Farmland Preservation Act and various economic incentives.
4. Self-sufficiency—in the event of an oil crisis, we need to have food grown locally; income from exports of agricultural products; income and jobs created by agricultural product processing.
5. Student answers will vary.
   support—farmers, economic planners
   oppose—developers
   in the middle—environmental groups
   split—residents in farm counties, developed counties
6. The main threat to agriculture in New Jersey is that the value of the land is greater than the value of the agricultural commodities produced by the farmland.
7. Sustainable agriculture includes practices that provide for the needs of the current population without depriving future generations of the ability to provide for their needs.

Lesson 10

1. Answers will vary, but should include integrated pest management, contour plowing, and crop rotation. Pamphlets can be obtained from the local Soil Conservation District office, county agricultural cooperatives, agricultural societies.

Answers to the remaining questions will vary, but should be supported by references.

Lesson 11

Evaluate student use of data, graphs, maps, and posters to support their point of view. There should be a definite point of view expressed and supported.

Lesson 12

Student answers may vary but should be logical and be supported by references. Individual students can be assessed based on their individual consensus statements.

Glossary

bar graph ... a bar graph is used when data are discontinuous; spaces are left between the bars — this is a good way to show comparisons among items

best management practices ... schedules of activities, prohibition of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of the "waters of the state"

census ... a head count taken to determine the number and distribution of people in a population; a national census is conducted every 10 years in the United States

chloropleth map ... shows the difference between areas by using colors or shading to represent distinct categories of qualities or quantities

geographic information systems ... (GIS) a geographic database that contains information about the distribution of physical and human characteristics of places or areas. In order to test hypotheses, maps of one characteristic or a combination can be produced from the database to analyze the data relationships

integrated pest management ... (IPM) an agricultural best management practice; a critical feature of IPM is that chemical pesticides are applied only when crop damage from pests reaches economically significant levels; IPM requires close monitoring of crops to identify insects and insect population levels

line graph ... a line graph is used when both the x and y variables are measurable and the data are continuous—this is a good way to display data over time

map ... a symbolic representation of the earth's surface on a flat piece of paper that is usually drawn to scale

pictogram ... a pictogram uses symbols for objects which have been counted; the variable is displayed along the x-axis and the count is displayed along the y-axis

pie graph ... a pie graph is used when data are expressed in percentages; the total percentage equals 100% and the segments are proportional to the percentage they represent—this is a good way to show items' relations to the whole

population density ... the number of people living in a given land area

soil ... a layer of mineral and organic material that usually contains plant roots, living animals, plant and animal remains, air, water, and minerals from weathered rocks; soil is produced by the slow, continuous physical and chemical breakdown of rock and by the decay of organisms that were once alive

sustainable agriculture ... the production of agricultural goods to meet the needs of today without compromising the ability of future generations to meet their needs; sustainable agriculture is not the same thing as organic farming

References

Collins, Beryl Robichaud and Karl H. Anderson. *Plant Communities of New Jersey: A Study in Landscape Diversity.* New Brunswick, NJ: Rutgers University Press, 1994.

Dunn, Margery D., Editor. *Exploring Your World: The Adventure of Geography.* Washington, DC: National Geographic Society, 1995.

Braus, Judy, Editor. *WOW! - A Biodiversity Primer.* Washington, DC: World Wildlife Fund, 1994.

Klinkenborg, Verlyn. "A Farming Revolution: Sustainable Agriculture." *National Geographic,* Vol. 188, No. 6, December 1995, pp.61-88.

The New Jersey State Planning Commission. *Communities of Place: The New Jersey State Development and Redevelopment Plan.* Trenton, NJ: State of New Jersey, Department of the Treasury, 1992.

New Jersey Department of Labor, Division of Planning and Research, Office of Demographic and Economic Analysis, *Population Projections for New Jersey and Counties: 1990 to 2020 Vol 1,* November 1985.

New Jersey Agricultural Statistics Service, USDA, and New Jersey Department of Agriculture. *New Jersey Agriculture 1995.* Trenton, NJ: New Jersey Department of Agriculture, 1995.

New Jersey Network. *Target New Jersey Video Series: Farmlands on the Edge.* Trenton, NJ: New Jersey Network, 1989.

Chesapeake Farms Project: Sustainable Agriculture-Information Kit. Chestertown, MD: Chesapeake Farms Project, 1996.

SPECIAL FREE OFFER

Where Are the Gardens in the Garden State?
Middle School Lessons on Sustainable Agriculture and Farmland Preservation

Written by Loris Chen
Seventh Grade Teacher
North Arlington Middle School

This nine week study skills unit contains

- 12 lessons that can also be taught individually
- pre- and post-tests
- 12 data sheets
- student readings
- reproducible maps
- answers to lesson questions
- glossary

LESSONS

1 *Where are the people, and why are they there?*
2 *Where will the people be?*
3 *How dense is dense?*
4 *What's a big county?*
5 *What's growing in the Garden State?*
6 *Where are the farms?*
7 *How are soils, bedrock and farms related?*
8 *What puts the green in Garden State farming?*
9 *Why are farmlands on the edge in New Jersey?*
10 *Can agriculture be sustained in New Jersey?*
11 *Should state government help preserve farmland?*
12 *Can we find common ground?*

New Jersey Core Curriculum Standards supported:
Science: 5.1; 5.10; 5.12
Social Studies: 6.1; 6.3; 6.4; 6.6; 6.7; 6.8; 6.9
Language Arts: 3.1; 3.2; 3.3; 3.4; 3.5
Math: 4.4; 4.13
Workplace Readiness: 2, 3
National Geography Standards supported:
1, 3, 11, 12, 13, 18

Two other teacher resources from the New Jersey and Sustainable Development Program in preparation. **The New Jersey Highlands and Watershed Issues: Interdisciplinary Lessons for Middle School**, by L. Chen, and **Civics and Science in New Jersey: Secondary Lessons for a Sustainable State**, by Paula Gotsch and Jeffrey Brown

Thanks to foundation support, the first printing of these lessons will be disseminated for only a $4.00 shipping and handling fee per book. *Order from* **Global Learning, Inc.**, 1018 Stuyvesant Avenue, UNION NJ 07083 Tele. (908) 964-1114 FAX (908) 964-6335 86 pages ISBN 0-928630-04-8

✂----------

ORDER FORM -- *Where Are the Gardens in the Garden State?*

NAME _____ PHONE _____

SCHOOL/ORGANIZATION _____

ADDRESS _____

_____ ZIP _____

NUMBER OF COPIES _____ @ $4 shipping & handling = AMOUNT ENCLOSED $ _____

Make checks or purchase orders payable to Global Learning, Inc. F.I.D.# 22-2217798

SEDIMENTARY ROCKS

CENOZOIC

a Holocene: *beach and estuarine deposits*

b Tertiary: *sand, silt, clay*

MESOZOIC

c Cretaceous: *sand, silt, clay*

d Jurassic: *siltstone, shale sandstone, conglomerate*

e Triassic: *siltstone, shale sandstone, conglomerate*

PALEOZOIC

f Devonian: *conglomerate, sandstone, shale, limestone*

g Silurian: *conglomerate, sandstone, shale, limestone*

h Ordovician: *shale, limestone*

i Cambrian: *limestone, sandstone*

IGNEOUS AND METAMORPHIC ROCKS

MESOZOIC

j Jurassic: *basalt*

k Jurassic: *diabase*

PRECAMBRIAN

l *marble*

m *gneiss, granite*

GEOLOGICAL MAP OF NEW JERSEY

30

Corrections

Spelling

A choropleth map shows the difference between areas by using colors or shading to represent distinct categories of qualities or quantities.

Map page 48

Letters i and m were inadvertently left off the Geological Map of New Jersey. The corrected map appears on the on the other side of this sheet.

Student Suggestion for Lesson 6

Students suggested that the "Land in Farms" be adjusted to "Acres of Land in Farms/Square Mile." County by county, students divided the acres of land in farms data by the square miles of land in the county. They then created a choropleth map using the adjusted data. This eliminated open space in less densely populated counties that is not in farms, but rather in forests. They used this to make decisions regarding the allocation of Farmland Preservation funds. They were able to defend their plan based on the distribution of farmland shown on the choropleth map.

Additional teacher resources from the New Jersey and Sustainable Development Project will be published in 1998.

The New Jersey Highlands and Watershed Issues: Interdisciplinary Lessons for Middle School

by Loris Chen

Contents

Lesson 1 New Jersey Highlands: What's in a Name?
Lesson 2 Location, Location, Location
Lesson 3 Where Have All the Forests Gone?
Lesson 4 Go with the Flow
Lesson 5 Soil in the Stream
Lesson 6 On the Edge
Lesson 7 Water, Water, Everywhere
Lesson 8 Preserving Pure Water
Lesson 9 Point Source/Non-point Source Pollution
Lesson 10 Should We Build It?

Civics and Science in New Jersey: Secondary Lessons for a Sustainable State

by Paula Gotsch and Jeffrey L. Brown

Contents

Lesson 1 The State We're In!
Lesson 2 Who's Got a Map? Who's Got a Plan?
Lesson 3 A Good Place to Live
Lesson 4 New Jersey Land Use and Water: What's the Connection?
Lesson 5 Cleaning Up New Jersey's Air
Lesson 6 A Systems View of the New York/New Jersey Harbor: Dredging Up a Controversy
Lesson 7 Wetlands in New Jersey
Lesson 8 Broadcasting Sustainable Development

For more information, contact
Global Learning, Inc.
1018 Stuyvesant Avenue
Union, NJ 07083
(908) 964-1114
email: globallearning@worldnet.att.net

Agriculture is a vital part of New Jersey's economy, employing thousands of people in a variety of careers on and off the farm. Our farm products can be found in homes statewide, throughout the nation and around the globe as well.

The Garden State's scenic vistas, open space and wildlife habitat, though sometimes taken for granted, are absolutely critical to the quality of life we all value so highly and they are a direct result of the thriving, diverse agriculture industry we have in New Jersey.

Arthur R. Brown, Jr.
NJ Secretary of Agriculture

93

ISBN 0-928630-04-8